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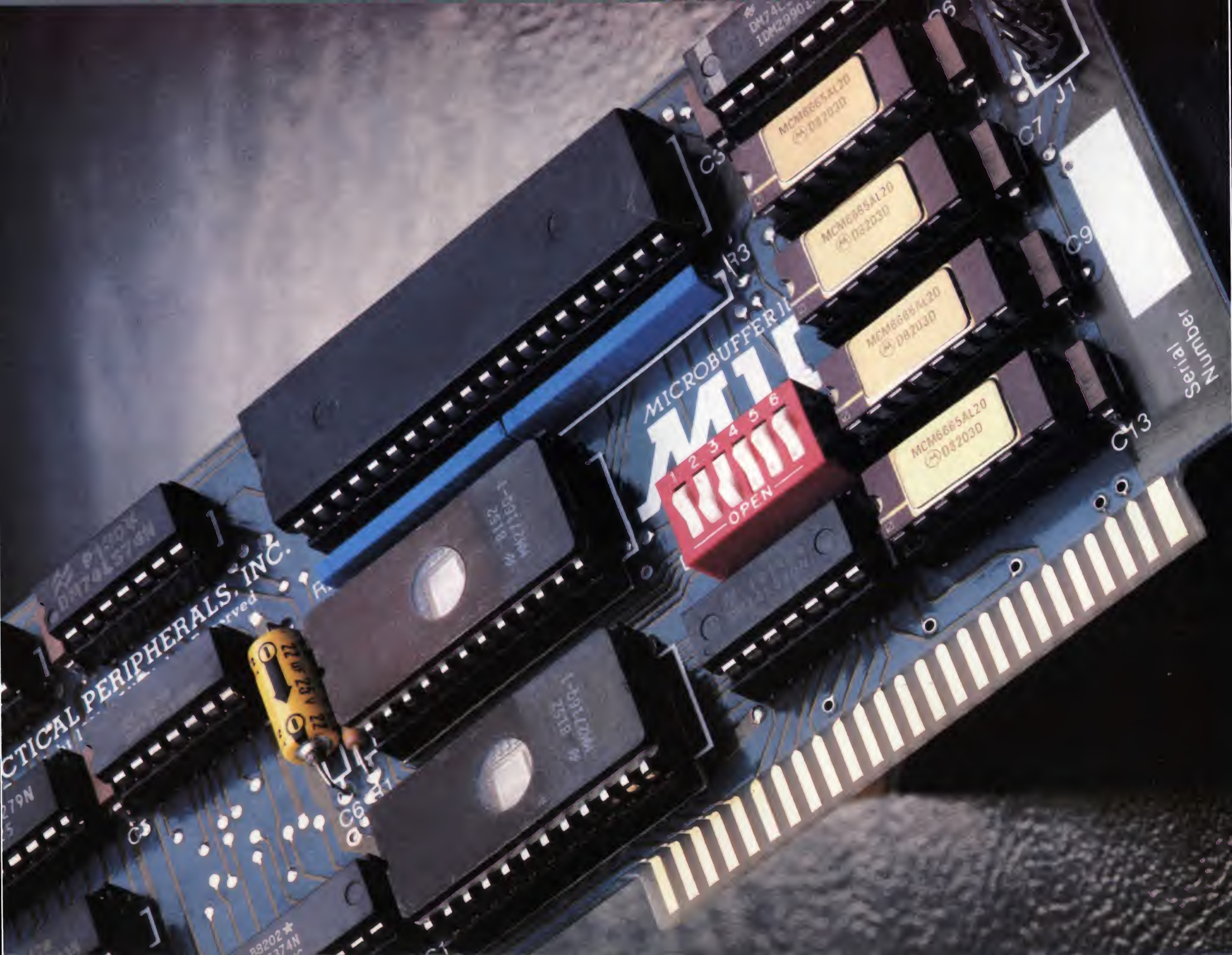
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Cover Contest: Playing Our Hands

The cover photo shows some of the paddles and joysticks in our three-part series of evaluations (see page 14). The hands on the joysticks and paddles all belong to *Creative Computing* employees. Can you match the names on the masthead with the hands on the cover?

We will award a free subscription (or renewal) to the first person who correctly identifies the eight people in the picture. All entries must be received by midnight, October 31, 1982. Send to: Hands, Ceative Computing, 39 E. Hanover Ave., Morris Plains, NJ 07950.

Photo by David Ahl.

September, 1982
Volume 8, Number 9

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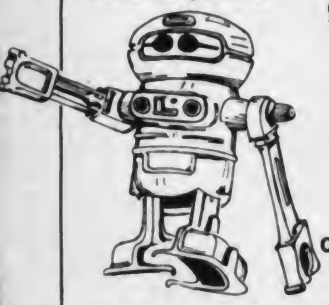

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CIRCLE 190 ON READER SERVICE CARD

utput...input/output...input

Obfuscation Obdurancy

Dear Editor:

Damn! Jack Nevison has let the cat out of the bag! Everyone else follows the rules when they put a Basic program listing into a popular computer magazine:

1. Leave out REMs. They just take up space and slow down the computer.

2. A space character is a waste character: Never hit the spacebar unless you absolutely have to.

3. Don't forget the right side of the TV screen: You can probably get eight or ten statemments strung out before you have to hit Return.

4. Be tricky. Use clever arithmetic. Use lots of GOTOs. People will think you're smart.

Along comes Nevison with all that indentation and all those blank lines and all those short lines and all those REM statements. My God! You can even read his programs and figure them out. There's not a single trick there. It's a disgrace. Are there no standards?

Someone has to take Nevison in tow. If you editors don't watch out, the whole world is going to find out they can write readable, well-structured, top-down programs in Basic. And then, what's going to happen to us poor Pascal authors? Without Basic to kick around, it could mean the soup lines. Damn!

Arthur Luehrmann
1466 Grizzly Peak Boulevard
Berkeley, CA 94708

Microsoft Basic + RAM Disk Does Not Compute

Dear Editor:

I would like to bring to the attention of your readership a matter of great importance concerning the Atari 800 computer system. I have a colleague who has purchased Microsoft Basic for the Atari 800. However, to his and my great disappointment and frustration, it does not support the Axlon RAMDisk (disk simulator) operating system.

I'm sure that there really is no reason why the RAMDisk could not be supported, but Atari has chosen to use two protection scemes which make it impossible to load Microsoft Basic as a binary load file.

I want to develop computer software and Atari's decision is hampering my ability to do so. I urge all interested parties to contact Atari.

Dennis Baer
868 Main Street
Farmingdale, NY 11735

VIC Keeps Its Cool

Dear Editor:

I am a high school student who does considerable work on my VIC-20, especially for science fairs and world history projects. Sometimes these take as much as 10K-12K of memory, which means long hours of programming. This causes overheating, which is quite dangerous for the computer.

So I decided to do something. I inspected the bottom of the VIC and found that at the right-hand side there are some openings. So I drilled a 3 1/2" hole in my desk with a jig-saw, and installed a "spider fan" (which cost about $7). That was the end of my problem.

Now, even though my brother uses the VIC for long sessions of "Super Alien" and I use it for super-long programs, the VIC-20 remains quite cool.

Roberto Morales, Jr.
655 Hernandez St.
Miramar, PR 00907

No Codes Barred

Dear Editor:

I read with interest your reply to Frank Lambert's question "Could *Creative Computing* print its programs in bar code as well as typed form?" in the May, 1982 issue.

Like Frank, I would like to find a quick way of putting *Creative Computing's* programs into my computer *without* typing hundreds of lines of code.

I agree with your response that it just wouldn't be possible (economically) to make bar code available. Would it be possible to make your programs available on *MicroNet* or *The Source*? Many of your readers already subscribe to one or the other. The programs could be made available in the public access area and just for the cost of connect time, a subscriber could download your programs and have them up and running in a matter of minutes. There are already several magazines on MicroNet (including *Popular Electronics*) but there aren't any computer magazines. I think this would be a great service to your readers.

Bill Rosen
4334 McKee St.
Covington, KY 41015

We would like to hear from readers about this. If you think it is a good idea and would use such a service, please let us know—a note on a postcard would be sufficient.—EBS

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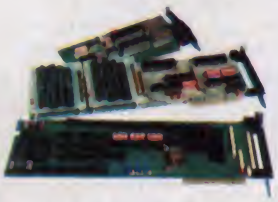

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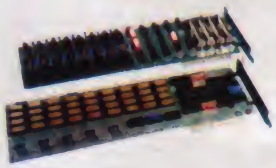

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CIRCLE 249 ON READER SERVICE CARD

Loose Lips Sink Tips

Dear Editor:

The advice given in "I Don't Understand..." (June 1982) seems sincere, and may help a few windy or pompous writers. But, for the most part, it should be taken about as seriously as the insights offered by Sunday magazine section articles called Ten Ways to Improve Your Love Life, or Five Tips for Getting Along With Your Boss.

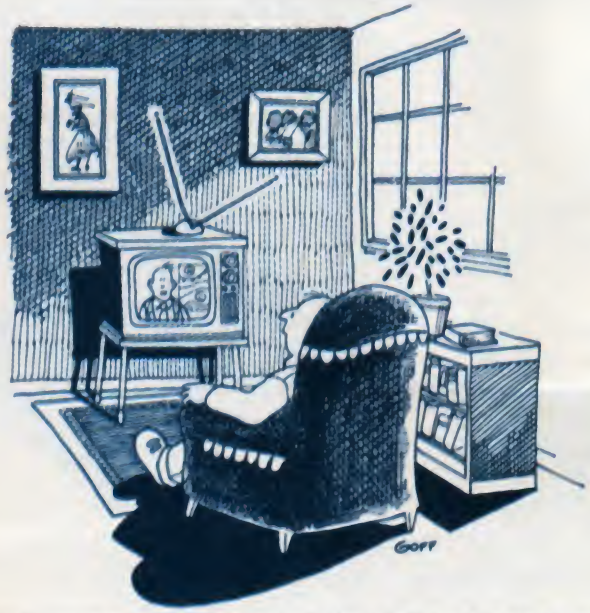
Unfortunately, there's just no easy way to present technical information. The English language is too versatile and too complex to accept mastery by a few cut-and-dried rules; that's both its difficulty and its virtue. Would you tell a Basic programmer to avoid Functions, Subroutines, Matrices, and String-Handling Statements to mask his proficiency, or to make his programs more readable?

The main, and most difficult, job of a technical writer is the judicious handling of numerous details. These must be organized intelligently, and presented in a manner that helps the reader follow the logic of that organization.

Then, what whould a popular technical magazine suggest to potential writers? How about: "Have something worth saying, and say it as clearly as you can. Use some sort of an outline. It also doesn't hurt to give some examples." This presupposes some consideration for the reader, a good knowledge of the subject, and a lifetime of reading and writing.

Jay Pastor
Technical Writer
Utica, NY

Sound advice. Unfortunately many people writing today score well on your first two qualifications (presuppositions) and fall woefully short on the last.—EBS



"Today's computer weather forecast calls for a high in the seventies, and showers this evening followed by an attack of alien spaceships."

Clarifying GraForth

Dear Editor:

In reference to Michael Coffey's review of *GraForth II*, I think some points of clarification are necessary. As a programmer who started from scratch with the *GraForth* package when it first came out in March and who has written exclusively in that language since, I offer some important considerations.

It is misleading to say that *GraForth* is machine language. Though it is true that the working version of any developed program or module is compiled, programming itself is done in a Forth-like language far simpler than machine code. At the same time, GraForth supports calls to other machine language routines and allows the programmer to view his Basic-like program listing at any time.

I strongly disagree that "for 2-D animation all the languages are equally good." Try, for example, moving 15 to 25 objects at once through Basic. If the name of the game you are developing is "Snail Pace," then yes, they are equal.

Also, it is important to recognize the differences in the manner in which 2-D character sets are created. With most tools this is a painstaking job during the creation process and a very wordy recall to print large character set designs. With *GraForth* the design process is simple, fast, and clear. The recall process involves two or three simple commands to print small or large blocks.

GraForth is also accompanied by excellent documentation and superb customer technical support. I am an end user who has just completed a marketable product using *GraForth*, and there is no question in my mind that it is a superior product for any graphics enthusiast.

M. Max McKee, President
Multi Data Service
Pear Software Division
407 Terrace
Ashland, OR 97520

Don't Debug In The Bathtub, Either

Dear Editor:

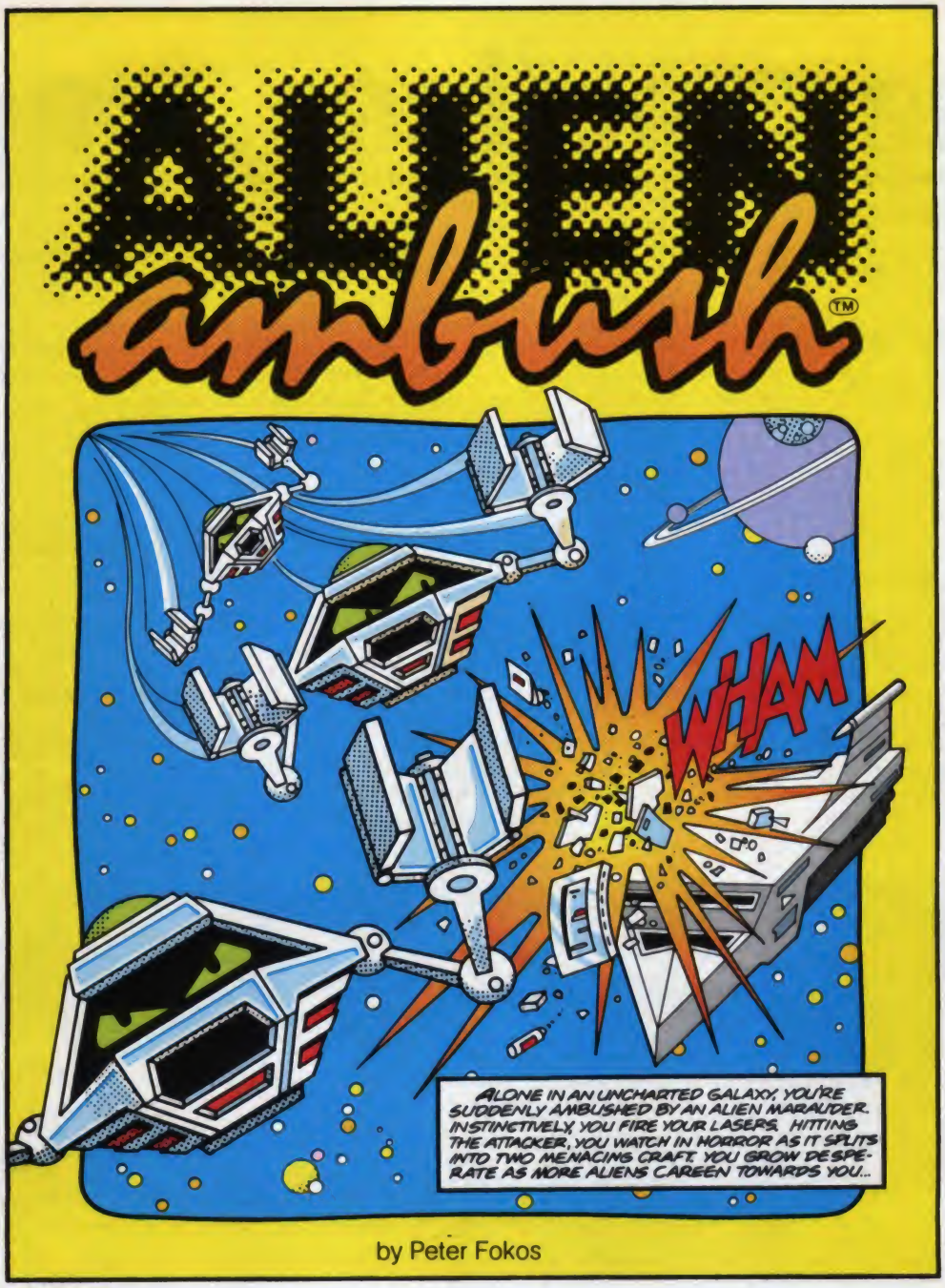
The suggestion from Mr. Press in the May "Input/Output" to eliminate static electricity problems with the TRS-80 Model I (a metal clamp around the wrist wired to ground) is very dangerous and should not be used.

Never ground your body through a low impedance path when working near electrical equipment.

The method suggested is particlarly hazardous, since if the free hand touches an electrically "hot" potential, current will flow across (or through) the heart; an area where a few milliamps can be fatal.

N. Edward Walker
President
Ampli-Tek
4341 W. Kennedy Blvd.
Tampa, FL 33609

Use a 1 megohm resistor between the radiator clamp and ground, and all will be well. Otherwise, purchase a commercial grounding bracelet.—MC



You haven't lived until you've died in space.

And here's your chance.

Software author Peter Fokos has created Alien Ambush, a space age nightmare. This hi-res, full-color arcade game is written completely in assembly language to give those nasty aliens every advantage.

So if you have access to a 48K Apple* with DOS 3.3, and you're hot for some new thrills, Alien Ambush was written for you. But be warned: It just got a lot tougher to survive in space.

Available at finer computer stores everywhere. *Apple is a trademark of Apple Computer, Inc.
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CIRCLE 185 ON READER SERVICE CARD

tices...notices...notic

Reward Increased

Level-10 has increased the reward for the return of the Alkemstone from $5,000 to $7,500.

Alkemstone is a computer adventure which now offers a $7,500 cash reward to the first person who can find the missing Alkemstone, which is hidden "somewhere on the planet."

Alkemstone is written in machine language for any Apple Computer with 48K, one 16-sector disk drive and Applesoft or language card.

Timex Sinclair 1000

The Timex Computer Corporation will enter the personal computer market with the Timex Sinclair 1000. Sales will begin in July through the more than 100,000 Timex retail outlets, including computer stores, department stores and chains, consumer electronics, jewelry, and drug stores. This step is the result of an agreement between Timex and Sinclair Research Ltd. for Timex to market computers using Sinclair's technical expertise. Sinclair's mail order sales of the ZX81 will be phased out as Timex begins its marketing program. The announcement of the Timex entry into this new field and of the agreement with Sinclair was made by Daniel D. Ross, Vice President of Timex Computer Corporation, and affiliate of Timex Corporation, in New York on April 20.

The Timex Sinclair 1000 is basically the Sinclair ZX81, which Timex has already been manufacturing in Dundee, Scotland, but with two major differences. First, the new machine will have 2K RAM instead of the current 1K on the ZX81. Second, the new machine will sell for a suggested retail price of $99.95 instead of the $149.95 for the ZX81. Also featured will be an instruction manual especially written for the first time computer user with step by step instruction and a course in fundamental programming.

Peripherals for the Timex Sinclair 1000 will also be sold by Timex along with the basic machine. The first one available is the 16K RAM expansion module for $49.95 (Sinclair's current 16K RAM is $99.95). In the fourth quarter of 1982 a printer and a telephone modem are expected to go on sale for $99.95 each. The modem will offer a significant enhancement for many users and will feature: 300 BAUD, standard Bell Telephone jack attachments, and auto-dial capability. It will give a direct tie-in with large computer data services.

Timex plans to supplement the hardware offerings with a range of software, including business, personal financial management, education, and entertainment. The price range of the programs is expected to be from $9.95 to $19.95.

The marketing program will aim at the first-time computer buyer, the educational market, and computer buffs. The potential market for personal computers is estimated at over 90,000,000 customers. In addition to instructional displays in the retail outlets, Timex plans to support the retailers with an extensive service network, a 90-day guarantee, and a national ad campaign beginning in August.

—Paul Grosjean

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CIRCLE 174 ON READER SERVICE CARD

7 Years Ago in creative computing

The Sept/Oct 1975 issue of Creative Computing had a central theme of computer literacy and user friendliness, timely topics even today. Alexander Cannara of Stanford compared four languages: Basic, Fortran, Algol and Logo and recommended when each should be used. Logo in 1975? Yes, and Smalltalk too!

Marian Goldeen wrote of her experiences using Smalltalk at the Xerox Palo Alto Research Center. Six years later, Xerox finally released Smalltalk commercially.

Steve Gray wrote a fascinating article, "Building A Computer of Your Own" which described two newly announced computer kits, the Scelbi-84 and Altair 8800. He also told where one could obtain plans for four totally homebrew machines. Steve felt a good follow up article would be, "What Are You Going to Do With Your Computer?"

This issue also carried the first MITS ad for the Altair. Price for a complete kit (no memory) was $439, assembled and tested $621. A 1K memory board cost an additional $97 (kit) and a 4K board $264. A serial interface was another $119. Want to use the computer? Then you'll probably want a terminal, say a used Teletype ASR-33 for $750 or so.

The issue carried 22 pages of educational activities including a fascinating piece on learning with Turtle Geometry concepts without computer hardware. We also announced the First National Student Computer Fair cosponsored by AFIPS and Creative Computing.

Games? Sure. An unsuspecting world was introduced to Greg Yob's marvelous Wumpus, an enduring classic. Also destined to become a classic was Civil War, an educational simulation game of 14 Civil War battles.

Twenty-three books were reviewed in depth including six in the series reviewing all 34 books on the Basic language. ☐

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CIRCLE 111 ON READER SERVICE CARD

Apple Paddle Controls and Game Port Extenders

David H. Ahl

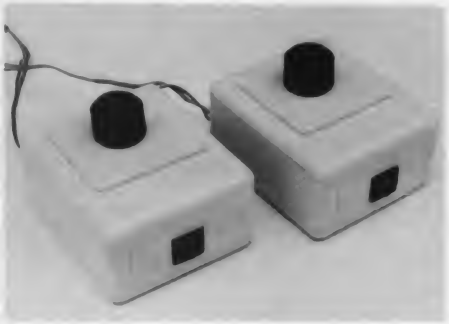
This evaluation of paddle controls and game port extenders is the second of a three-part series. Last month (August) we evaluated Apple and Atari joysticks. Next month we examine game controllers for the TRS-80 and some rather interesting arcade-type controls for the Atari.

A2D Paddles (2002)

The A2D model 2002 paddle controls were physically the largest ones in this test. Children or women with small hands may find these controls too large for handheld use. On the other hand, most of our players judged them just fine.

Since the case is nearly square and the firing button is located in the center of one side (or end), it is equally easy to use with practically any finger of either hand. All of our players liked the large size (0.6" square), short throw, and positive click of the A2D firing button.

The knob is just under 1" in diameter, a size preferred by most players. Rotation is easy and provides precise adjustment to any point on the screen.



A diode isolation circuit prevented us from measuring the resistance of the potentiometers in the A2D paddles. However, as mentioned above, they provide precise control to any point on the screen.

The ribbon cables are a generous 8' long. Unfortunately, there is no indication which is paddle 0 and which is 1 (out comes the trusty masking tape). Each paddle has an internal trim adjustment, however, no instructions are given for using this and we assume, that once adjusted at the factory, there should be no further need for user adjustment.

Apple Paddles

Early Apple owners will remember the flimsy plastic paddles with miniscule firing buttons that came with the original Apple computers. Over the years, the design has changed several times; we tested one of the common types for comparative purposes. The paddles currently sold by Apple are described below.

The Apple Paddle is a small rectangular unit designed for handheld operation. The knob is just over 1-1/4" in diameter which most of our panelists deemed to be the "right" size. Not so for the firing button. It is minute (3/16" diameter) and leaves a nasty indentation in the finger pressing it.

The placement of the firing button on the left top of the case is less than optimal. In this position, it almost requires that the paddle be held with the left hand and the firing button operated with the thumb while the right hand attends to the knob. Left handed players will find that they must hold the case in their palm, reaching around to the top with the index or middle finger of the right hand to operate the firing button while turning the knob with the left hand. This sounds a bit awkward, but at least it allows one to alternate between two fingers doing the firing when the indentation in one becomes unbearable.

All in all, the Apple Paddle makes it obvious why a replacement market has sprung up to produce more user-friendly devices.

Incidentally, it is possible to improve the old Apple Paddle controllers dramatically for about $3.00 and one-half hour of time. The impovement comes about by replacing the firing button and the control knob.

There are many momentary-contact SPST switches that will fit in place of the existing one in the Apple paddle. Find one that has a large surface for your finger (3/8" diameter or more), short throw, and positive feel. I found some at the Trenton Computer Festival Flea Market for $0.50 each.

The other thing you will want is a new pair of knobs. Look for ones about 1" in diameter that are held on with a setscrew rather than the knurled friction fit of the existing Apple paddle knobs.

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valFORTH T.M.

valFORTH is an improved version of Atari's APX Forth and is upwardly compatible with it. valFORTH was written by Steve Maguire and Evan Rosen of Valpar International in conjunction with Patrick Mullarky, the author of APX Forth. Specific improvements are:

- Many important existing and new routines have been coded in 6502 for the high speed so necessary in graphics applications.
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- Video Editor: A fast, powerful VIDEO screen editor, like MEMO PAD. (*Does not* use the slow Atari Operating System for displaying screens.) The Editor supports insert and replace modes and has a visible 5 line buffer. Makes editing a pleasure! (Requires valFORTH)

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The Character Editor allows fast composition (using the joystick) of character sets with a simultaneous display of the created characters. Sets may be saved to disk for later recall. It is, also, ideal for composing Player and Missile images.

The Sound Editor allows simple, simultaneous, independent control of all four variables of all four voices possible using one joystick per voice. Any single-setting sound of the Atari can be created with a graphical and a tabular readout. (Requires valFORTH)

• • •

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CIRCLE 251 ON READER SERVICE CARD

Pop open the case of the Apple paddle control (some have one screw, some don't), unsolder the old switch and remove it, and install your new switch. If your new switch requires a larger hole than the existing one, you'll have to enlarge the hole with a rattail file. Solder on the wires. Be sure to use the set of normally open (NO) contacts if you have an SPDT switch. Reassemble the case. Pry off the old knob and put on your new one. You'll be amazed at the difference!

Hand Controller

These attractive, wedge-shaped controllers from the Keyboard Company (now owned by Apple Computer) are obviously designed for handheld use, though they may be used on the tabletop as well.

Departing from the design of other manufacturers, the firing button is located on the right rear side of the controller. It is a large rectangular controller which pushes down a microswitch, thus it provides both tactile and aural feedback. While extremely easy to press, some players felt that the large size of the button tempted them to hold their finger on it thus preventing the quick release required in games needing fast firing. In other words, these players felt they had to consciously both press and release the switch. On the other hand, some other players (right handed) liked being able to control the firing button with their left index finger instead of a thumb.

The knob is a two-tiered design, the center of which is about 1" in diameter and the outside just over 2". We found this design was quite satisfactory for players who liked a small knob as well as those who liked a larger one. Detracting from the pleasing knob design, potentiometer rotation was rather stiff which some players felt hampered game play. On the other hand, I achieved my all time high score in *Tsunami* with this set of paddles.

A thoughtful touch is the molded "0" and "1" on the center of each paddle knob. Also thoughtful is the strain relief on the cable which goes in the notch of the Apple computer behind the game I/O port. In addition, a grounding clip is provided which is connected to the cable shield to minimize RF interference. These were the only paddles with an external cable ground.

Pro Paddles

These paddles were by far the most diminutive of those tested. They measure a scant 1-1/2" x 2-1/2" and have a 1" diameter knob. A 3/8" square firebutton is mounted on the back of the paddle. A thoughtful touch is the numbers 0 and 1 inscribed on each knob. This is a far tidier way of identifying paddles than the strips of masking tape I have on the backs of other paddles.

The small size of the Pro Paddles was praised by some members of our panel along with the placement of the firing button which makes it very easy to hold the paddle in one hand using first or middle finger to fire while the other hand controls the rotation. The fire buttons have a very short throw and a definite tactile feel when contact has been completed which some players found to be an advantage. Having the firing button squarely in the back also does not unduly favor right or left handed people. On the other hand, some people felt that the size of the Pro Paddles was just too small. However, this seemed to be a matter of preference because others liked the size very much.

In place of the flat cables found on many paddles and joysticks, Pro Paddles use a round, 3-1/2' cable for each paddle. While 6" to 12" shorter than most others, the round cables seem to be more flexible than flat ones and the difference in length was not noticed. Indeed, if a game extender is used, there is no reason for joystick and paddle cables to be over 2' or 3' long.

The potentiometers in the Pro Paddles seem to be stiffer than others, i.e., more difficult to turn and adjust. One player felt that this was an illusion as a result of the small size. As we did not measure this variable, stiffness remains a subjective observation.

Apparently there are two different designs of the Pro Paddle; please see the photograph which shows the one that we tested.

In summary, the reaction to the Pro Paddle had more subjective factors than most others—small size, button placement, and stiff rotation. Some people liked the Pro Paddles very much while others were lukewarm. The best bet is to look at a pair in your local computer store or at a show before you buy.

Adam and Eve

The Adam and Eve Paddles are an attractive, hand-fitting trapezoidal shape. The firing button is on the left rear side of the case, thus making it easy for both right and left handed players to control. Curiously, paddle 0 is labeled Eve and paddle 1 is labeled Adam.

The knob is just under 1" in diameter which most players found convenient particularly for fast movement from one end of the rotation to the other. Move-

Apple Paddle Controls

Manufacturer	*Model/Name*	*Price*	*Size W x D x H*	*Table Top/ Hand Held*	*Potentiometer Resistance*	*Trim*	*Knob Size (in dia.)*	*Button Size (in dia.)*	*Button Placement*	*Tactile Feedback*
A2D	2002	34.95	3.0 x 3.5 x 2.0	Both	n/a	No	0.9	0.6 sq	Rear side	Yes
Apple Computer	Paddles (original)	39.95	2.5 x 3.2 x 0.8	Hand	150K	No	1.3	0.2	Left top rear	No
The Keyboard Company	Hand Controller	29.95	2.0 x 4.5 x 1.0 (1)	Both	150K	No	1.0/2.0	1.0 x 0.6	Right side rear	Yes
Computer Works	Pro Paddles	49.95	1.5 x 2.5 x 1.3	Both	150K	No	1.0	0.4 sq	Rear side	Yes
Kraft	Paddles	49.95	(2)							
Tech Designs	Adam and Eve	39.95	2.0 x 3.5 x 1.0 (1)	Both	150K	Yes	0.9	0.4 sq	Left side rear	Yes
TG Products	Super Paddles	39.95	2.0 x 4.0 x 1.0	Both	135K	No	1.4	0.6	Left side rear	No
Zircon	Alpha Command	19.95	2.0 x 4.3 x 1.0 (1)	Hand	150K	No	1.0/1.7	0.4	Right side	No

(1) Shape is not rectangular (2) Not available in time for this test

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One Step Ahead

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ment of the potentiometers was easy and precise.

The 3/8" square firing button has a very short throw and a positive click when pressed, thus providing both tactile and aural feedback.

Each potentiometer has a trimmer control which allows the paddle to be matched precisely to your computer or particular games. These were the only paddles with an adjustment of this type. This trimmer is also said by the manufacturer to be able to compensate for excessive wear, a useful feature.

The five-foot cables to the paddles are more flexible than most and Tech Designs has thoughtfully provided a stress relief at the DIP connector end to prevent the cable from being pulled out of the back of the Apple.

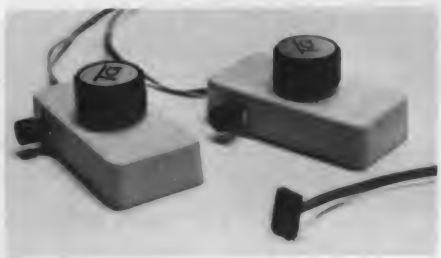
In summary, we felt the Adam and Eve paddles were exemplary in all regards.

TG Super Paddles

The TG paddles are rectangular in shape with the firing button on the left rear side of the case. This position is suitable for either left or right handed players. The size lends itself to either handheld or table top use.

The firing button is a large 0.6" in diameter but, unfortunately, has a fairly long throw and no positive feedback when contact is made. Some players felt that this button provided less-than-precise control of firing and also contributed to finger fatigue. Other players barely noticed.

The knob was the largest of any paddles tested, 1-1/4" in diameter. Since most games use only a portion of the potentiometer rotation, theoretically a large knob can be adjusted more precisely. Indeed,



with our playing panel, the size led to sharply divided feelings: some players liked the large knob very much and others did not. On the other hand, all players agreed that the TG paddle could be adjusted very precisely and that the potentiometer was exceptionally easy to rotate.

Older TG paddles used a round cable, while new ones are coming through with ribbon cables and improved DIP connectors. There are no cable strain reliefs. Paddle 0 is designated by a red TG logo and paddle 1 by a black logo, a thoughtful touch (assuming you can remember which is which).

Zircon Alpha Command

Under pressure from the FCC because of excessive RF radiation, Apple Computer stopped shipping paddles with their computers about 1-1/2 years ago. Did you ever wonder what happened to all of those paddles in stock? Well we can't be sure, but indications are that the latest models were bought up by Zircon and are now being offered as the Alpha Command paddles. If they are not the exact Apple paddles, they are an awfully good imitation.

Designed for handheld use, the Alpha Command paddles have a firing button on the right side of the unit. The paddle is shaped so that either left or right handed players will be able to hold it and press the fire button with either thumb, index finger or middle finger. The firing button has a relatively long throw and is concave in shape (outer lip higher than inner part of the button), hence it is somewhat uncomfortable for sustained firing. Also, some of our panelists were not pleased that the button did not provide either tactile or aural feedback.

On the other hand, the two-tiered knob was judged easy to move and met the needs of both those players who like a smaller knob (1" in diameter) and those who like a larger knob (1-3/4" in diameter). Adjustment of the potentiometer was accurate and precise on all games tested.

The cables are round and flexible and just over 4' long. They do not have a strain relief or shielding.

If you are looking for a bare bones, but adequate set of paddles, the price is right on the Alpha Command from Zircon.

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Extension and Auxilliary Game Port Devices

Name	Manufacturer	Retail Price	Cable Length	Number and Type of Input Sockets
Applexpander + S	CJM	$54.95	18"	2 Jones
Expandaport	Datamost	69.95	33"	6 DIP (3 switchable)
EX Port	Versa Computing	24.95	24"	1 DIP (Zero insertion pressure)
Game Socket Extender	Happ Electronics	14.95	24"	1 DIP (Zero insertion pressure)
Joyport	Sirius	74.95	24"	2 DIP (2 switchable) 2 DE-9 (2 switchable)
Octa Stick II	Astar International	22.95	6"	1 DE-9
Paddle-Adapple	So. Calif. Research Group	29.95	14"	2 DIP (2 switchable)
Paradise Ports	Tech Designs	39.95	18"	4 DIP (3 switchable)
Select A Port	TG	59.95	18"	5 DIP (4 switchable)

EZ Port

E Z Port from Versa Computing is a simple, straightforward extension I/O port for the Apple. It comes with a long 24" ribbon cable which probably makes for lots of RF interference but permits E Z Port to be mounted practically any place you desire: top, bottom, right, left, etc.

The device itself measures a dimunitive 1-1/2" x 2", just large enough for the cable connector and a zero insertion pressure DIP socket. Using this ZIP socket, you merely plug in the DIP connector from your joystick, paddle, etc. and throw a small switch which engages the connections within the socket. Mounted on the right side of the Apple, pin 1 is up and toward the front, a convenient position since the notched part of DIP plugs corresponds to pin 1. All in all, E Z Port is a simple, handy device.

Happ Game Socket Extender

This simple, functional device consists of a small PC board on which is mounted a zero insertion pressure 16-pin DIP socket with a sticky back designed to be mounted on the right side of the Apple case.

It has a 24" flat ribbon cable which can be snaked through the bottom or top of the Apple terminating in a DIP plug which goes into the game I/O port on the motherboard. To connect paddles or

joysticks, the DIP connector is simply plugged into the ZIP socket and the small lever switch thrown to the up or down position depending on how the board has been mounted.

Although Happ recommends that the board be mounted with the switch in the down position, we found it far more convenient to mount it so it was facing up and toward the front of the Apple case. In this position, pins 1 and 16 are toward the top which conforms to our recommendation identifying the end of the DIP connector with a small dab of liquid paper or white paint. Futhermore, in this position the cable leads to the back of the Apple case and can be neatly snaked out of the way.

The device works well and is a bargain at the suggested $14.95 retail price.

A second version, Model GS-2, is the same as the GS-1 with the addition of an extra female socket on the male plug end (inside the Apple case). This is useful for certain decoder chips and other devices which must always be plugged in and work in parallel with paddles, joysticks, etc.

Paradise Ports

On the 2-1/2" x 3-1/2" surface of this game extender device are mounted two switches and a jack to the 18" cable that plugs into the Apple game port. In addition, four sockets are provided to plug in paddles, joysticks, etc. The design is unusual in that the sockets are actually a part of the printed circuit board itself. Sockets A, B and C are switchable, while socket D is permanently wired in parallel with the Apple game port. Socket A always goes into paddle port 0 and 1, while socket C always goes into paddle ports 2 and 3. Socket B may be switch selected for either one or both.

The entire back of the blue printed circuit board is covered by a rubber cushion pad. Together, the PC board and pad are

only 5/16" thick. While the instructions state that Paradise Ports is "mountable on Apple case," short of using Contact cement or drilling screw holes, we could not figure out an easy way to mount it on the case. Nevertheless, its compact size means it does not take up much space on a desk or table.

TG Select-A-Port

Select-A-Port is an extender which allows up to five devices to be selected singly or simultaneously for input to the Apple. It is relatively compact, measuring 6" x 3" x 1/2" and has five DIP sockets with a switch above each one. With four small rubber feet, it can be used flat on the surface of a table or a desk or even the top of the Apple. In addition, two small plastic mounting brackets are included which permit it to be suspended from the cooling fins on the left or right side of the computer.

Socket number 1 is a non-switchable socket which directly parallels the game I/O port. This is for sensitive devices with which diode isolation would interfere.

Sockets 2-5 are diode-isolated and switch selectable. Socket 2 modifies the device

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plugged into to it to operate paddles two and three which is useful in applications requiring dual joysticks or four game paddles. Sockets 3 to 5 parallel the game I/O port and are useful for paddles, joystick, light pen, etc.

The instructions provided with Select-A-Port are scant but sufficient.

Select-A-Port is well designed and functional. We particularly like the individual switches on each port which allow eternal devices to be used one at a time or several simultaneously, something not possible with other extension port devices. The compact size is also a decided plus.

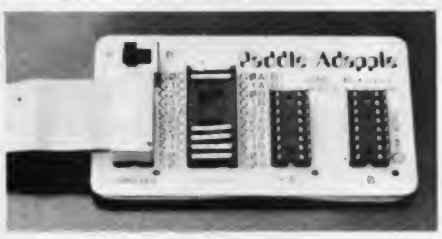
Paddle Adapple

Paddle Adapple goes one step beyond a game port extender in that it may be used in two modes. First, it may be used as a simple switch between two game ports; second, it allows for up to four paddles or two joysticks to be input to the Apple.

Paddle Adapple consists of a 2" x 3" sticky backed PC board on which are mounted three DIP sockets (one input, two output), a small switch, and a jumper socket.

To use Paddle Adapple as a switch, one device is simply plugged into DIP socket A and the other into B. The small side switch is moved to either position A or B thus selecting that device. In this mode the six jumpers installed with the unit as it is shipped are left in place. However, it is possible to change two jumpers to reverse paddle 0 and paddle 1 in case you have worn out your paddle 0 from playing too many games.

The second mode of operation uses the jumper socket to provide a wide range of input combinations to the Apple. For example, two joysticks or four paddle controls maybe input simultaneously to ports 0, 1, 2 and 3. Unfortunately, although the Apple accepts input from four devices,



it only has three "fire button" inputs. However, a fourth input is possible using the cassette input jack at the rear of the computer. Paddle Adapple includes a plug and cable to go between the cassette input jack and the jumper socket on the unit. For those into it, this will allow four-player paddle/fire button games to be written.

The jumpers can also be used to exchange the X and Y axis on joysticks, use a light pen and paddles (or joystick) simultaneously, or use shift key modifications that plug into the game I/O socket.

The 14" cable on the Paddle Adapple permits it to be mounted any place on the right side of the computer. Our one minor complaint is that the two output sockets are not zero insertion pressure sockets. Although theoretically one should not be changing devices around much with Paddle Adapple, we regularly use three, and occasionally four, devices which must be plugged in through the game I/O port. Thus, we prefer zero insertion pressure sockets.

Another minor complaint: when mounted on the right side of the Apple case, pin 1 is down to the rear, which is not the "natural" way one might expect to plug in a device. This is a very minor complaint, as the manufacturer obviously did not intend that the devices be plugged and unplugged from Paddle Adapple with any frequency.

Paddle Adapple comes with six extra jumper cables—enough for doing practically anything as well as replacing a cable or two. It also includes a cassette input cable and a comprehensive eight-page instruction manual.

Expandaport

Measuring 6" x 4" x 2", Expandaport was physically one of the largest extension port devices that we tested. Its six input DIP sockets were also more than found on any other device. They are clustered in three pairs on the top of the unit along with a small three-position toggle switch.

The instructions recommend that connector J-1 be used for game paddles and J-2 for a joystick. J-3 is wired for an additional joystick input (or two paddles) to ports 2 and 3. It is recommnded that J-4 be used for a lightpen. These three inputs (J-1, J-2 and J-3 together and J-4) are selected with the three-position toggle switch.

Two additional sockets labeled J-5 are also available. It was not clear from the instructions how these were selected. Trial and error proved that they were both permanently wired in parallel with the input I/O and the position of the switch has no effect on them.

Expandaport also has a small speaker mounted in the left side of the unit and a

cable which plugs into the Apple speaker connector on the right front of the motherboard. We have long been proponents of an external speaker for the Apple and found that it has ample power to drive a good quality 8 ohm extension unit. Indeed, the volume from an inexpensive $15 or $20 speaker is five to six times that from the internal Apple speaker. Thus, we had great expectations for the Expandaport extension speaker. Alas, the reality is that the sound is of lower volume and quality than that provided by the internal Apple speaker. The speaker in Expandaport is smaller than that in the Apple and has a sound reminiscent of the earphones that came with early transistor radios.

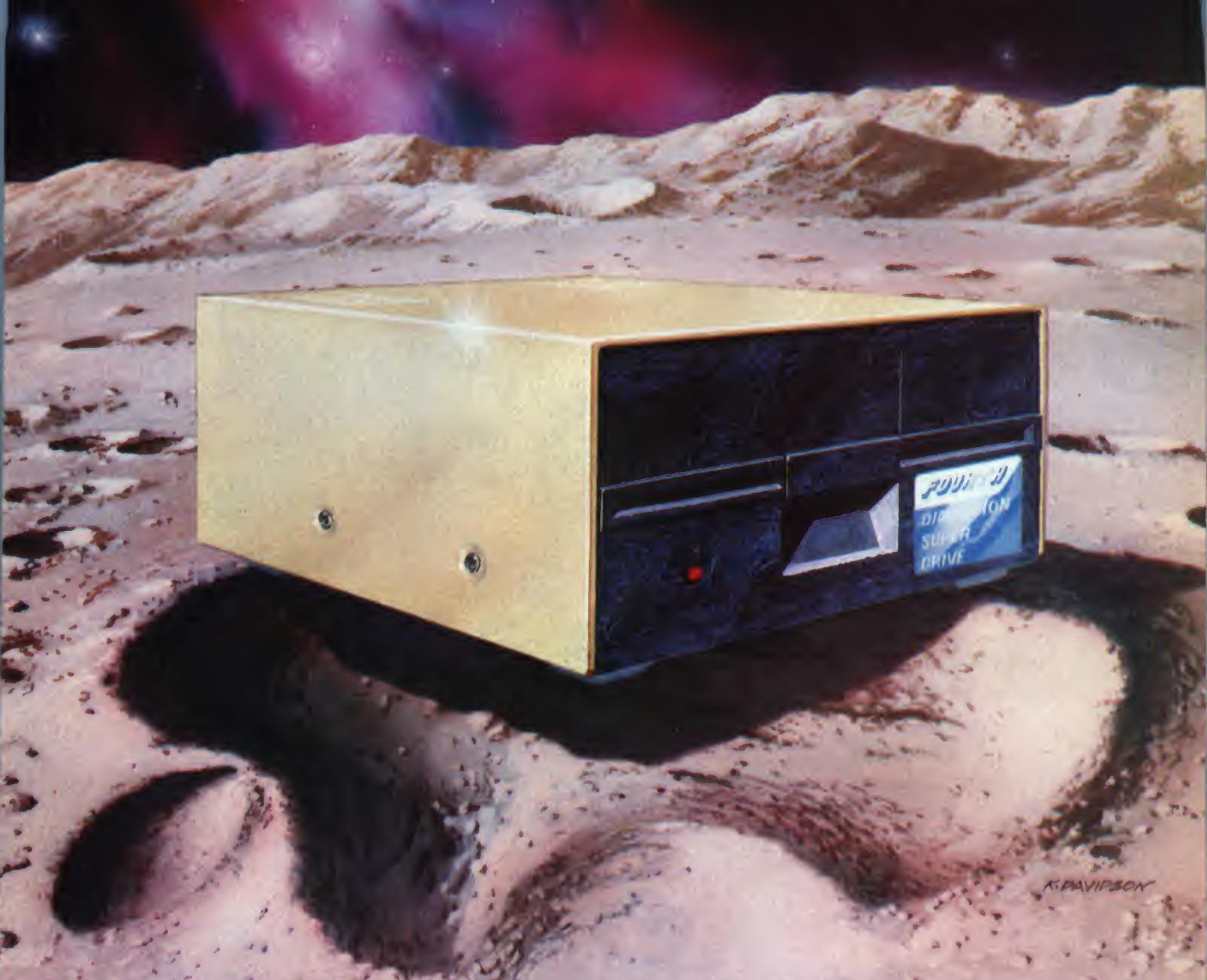
Expandaport comes with a generous 33" cable. Unfortunately, the instructions are not equally generous in their explanation of how to use the device. The best part of the instructions is the program which tests every function of every device that can be plugged into Expandaport. On the other hand, the instructions do not tell the user what to do about software protection devices, and lower case adaptors, which may require use of the game I/O. (They can be plugged into J-5.)

In summary, for most applications, the paucity of instructions will pose no problem. Our advice: ignore the speaker and look at Expandaport as a versatile, convenient, expansion I/O port device.

CJM Applexpander + S

The Applexpander is part of the CJM Microsystem, a comprehensive input, output and control system for the Apple. It differs from all the other expanders in that the Applexpander uses Cinch Jones plugs and sockets, thereby requiring the purchaser to use only CJM components. A Jones plug to DIP socket converter is offered by CJM, but that seems to be defeating the purpose of the Microsystem.

As mentioned, this is more than just an extension port. We will first look at the input capabilities and then the output/control capabilities. Like other expansion devices, the 18" ribbon connector is designed to snake through the top of the Apple case after it has been plugged into the Apple game I/O port. The instructions refer to a diagram A for mounting the



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Applexpander on the case, but there was no such diagram in the manual. On the other hand, it was not difficult from the position of the sticky backed tape on the side of Applexpander to determine how it should be mounted on the right side of the Apple case.

Applexpander has two input sockets which can accept the usual two paddles, one joystick, light pen, or other input sensor as long as the device terminates in a Cinch Jones P-306 CCT plug. A full complement of such devices is available from CJM or the Jones plug may be installed on the cable of existing devices. Although a wiring diagram is provided in the back of the manual, we don't recommended doing this if it is your first construction project. If you have built at least one Heathkit, you'll have no trouble installing a Jones plug.

Input socket 1 is connected to paddle port 0 and 1, while input socket 2 goes into ports 2 and 3. These are not switched sockets; both are permanently connected. Five pages in the rather comprehensive manual are devoted to describing the operation of paddles and joysticks as graphics and game input devices. Five sample programs are included which demonstrate these concepts.

The "+ S" in the name of the device refers to "+ Speaker." Three twisted wires from the Applexpander are snaked through a cooling slot and are used to connect to the internal Apple speaker output and the speaker itself. Applexpander has a mini phone jack on the left front of the unit which provides for an external speaker to be plugged in. Additionally, Appleexpander has a volume control which adjusts the volume of the internal or external speaker. If an external speaker is plugged in, the internal one is automatically turned off.

Although the Apple accepts input from four potentiometer devices, it only accepts three switch inputs through the game port. Assuming one has the CJM Microstick, switches 0 and 1 are located on it. However, for some applications it may be desirable to be able to trigger the third switch (SW2) without having another joystick or set of paddles. Applexpander provides this capability in the form of a small pushbutton switch on the case of the unit.

Located adjacent to the pushbutton for switch 2 is a mini-jack. The function of this jack is to allow an external switch to be read into the SW2 input. The switch and jack are in series. The jack accepts only normally closed switches, but any number of these external NC switches can be wired in series and plugged into the mini-jack. If one of the switches is thrown, then the Apple will read SW2 as thrown.

This type of system can be used for security. For example, a series of switches around the house can be wired in series and if any one of them is thrown, the Apple would "know" it and could turn on an output module through the control box described below which, in turn, could turn on an alarm.

Another application might be a "failsafe," in which the Apple is used as a controller. Tripping a limit switch would halt the Apple and the system would shut down with the Apple signalling a warning.

In addition to the input ports on the game I/O, the Apple also has four annunciator outputs. These outputs are controlled by "soft switches," which is the term used to designate an output which is switched on from one memory location and switched off from another. For example, for annunciator 0, memory location -16295 is the on switch and -16296 is the off. To throw the switch on or off, its appropriate memory location should be loaded with 00. This is accomplished with POKE (address) 00 from Basic or, from machine language, a LDA $300 then STA (hex address). These routines are fully described in the CJM Microsystem instruction manual.

You may be saying, "This is fine, but what's it good for?" By itself, not much. But with an additional relay control module, these output switches can be used to control a wide variety of household devices such as a video tape recorder, lights, security devices, hi-fi system, or anything at all that can be turned on or off. In other words, with the addition of a relay box, the Apple soft switch becomes a real-world hardware switch.

In summary, the Applexpander +S is the heart of the comprehensive CJM Microsystem. The rugged Jones plugs will probably last far longer than the Apple itself. Used only as an extender, the unit is somewhat pricey. However, considering the additional output and control capabilities, the extension speaker, and the access to switch 2 open up many new possibilities and put the CJM Microsystem into a unique niche in the market.

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Sirius Joyport

(Review by Randi J. Rost.)

The Joyport is Sirius Software's first entry into the hardware field. It consists of a small plastic case about 6"x 4"x 1" that contains four I/O ports. The joyport serves as a game socket extension. In addition, it is an expansion to allow the use of two sets of Apple game paddles (with all four pushbuttons operational) as well as two Atari-type joysticks.

The Joyport user's manual is a 20-page document that contains several diagrams to aid in proper installation. The manual also contains instructions on using the Joyport and source listings of two example programs, one in Applesoft Basic and the other in Pascal.

Besides extending the game I/O socket, the Joyport also allows the Apple to recognize input from Atari-type joysticks. Two switches on top of the Joyport allow you to select which device (or devices) plugged into the Joyport will be active." One switch allows you to choose between activating the two Atari ports (front) and the two Apple ports (back). A second switch allows you to choose whether the left, right, or both ports are activated.

Before going any further let's set the record straight about some of the things that the Joyport cannot do. Most important, existing programs that use Apple game paddles will not work automatically with Atari joysticks once the Joyport is installed.

Games that use game paddles will be completely compatible with the Joyport when you use game paddles plugged into the Joyport. If you want to use Atari joysticks you must either modify your games yourself, or buy software written expressly for use with the Joyport and Atari joysticks.

Why hasn't someone come out with an adapter for the Atari joystick before now? Simple: the Atari joystick works on a completely different principle than Apple game paddles or joysticks. The Atari joystick consists of five switches, that's all. No potentiometer, just five switches. One of these switches is for the fire button, the other four represent the four cardinal points of the compass. If you push the joystick left, the "west" button will be depressed internally. If you push the joystick down and to the right, both the "south" and "east" buttons will be depressed. Diagonal movement is detected when two buttons are depressed simultaneously (e.g., up and left equals northwest.)

In order to obtain values for all five switches, the Joyport must be accessed twice. The first time, annunciator 1 is "off", (accessing location $C05A will turn it off) and the Joyport returns values for the fire, "east" and "west" buttons in the

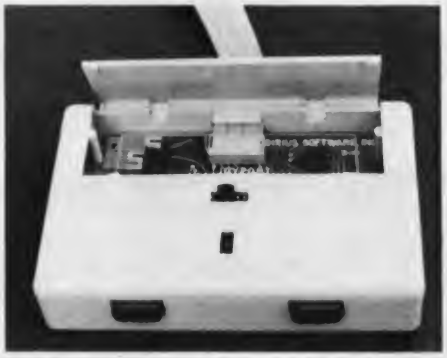
locations for pushbuttons 0, 1, and 2 respectively. Accessing location $C05B (turning annunciator 1 'on") will signal the Joyport to return values for the fire, 'north," and "south" buttons in the same three locations.

Thus, to obtain values for all five buttons, first look at locations $C061-$C063 with annunciator 1 "off" to read values for the fire, "east" and "west" buttons. Then access locations #C062 and $C063 again with annunciator 1 "on" to get values for the "north" and "south" buttons.

As you can see, the Atari joysticks will behave much differently from Apple game paddles. They have absolutely no effect on the game controller locations ($C064-$C067) that are used to interpret the current paddle position. It is for this reason that existing software will not automatically run using Atari joysticks instead of Apple paddles.

Despite the incompatibility, the Atari joystick provides another distinct advantage: input can be obtained much more rapidly. This is because of the way the Apple paddle works. To read the paddle, the timing circuit is reset and all game controller locations are set high (they contain values greater than 127). The time it takes for each location to drop below 128 is proportional to the setting of the game paddle. Button inputs can be read with virtually no time delay.

Another difference is that the Apple paddle pushbutton locations will contain a value greater than 127 if the button is being pressed. The Atari joystick buttons



cause just the opposite to take place: a value less than or equal to 127 signifies the button has just been pressed. This is a function of the Joyport. It ensures compatibility with the shift-key to pushbutton input two (pin 4) modification many users have made.

How does the Joyport work when the back switch is set to "both"? This position indicates pushbutton input should be accepted from both devices on the active side of the Joyport.

With the back switch set to "both," paddles 0 and 1 are obtained from the left side of the Joyport and paddles 2 and 3 are obtained from the right side. Turning annunciator 0 "off" (accessing location-$C058) will allow pushbutton inputs on the left side to be read normally. Switchiing it "on" (referencing location $C059) allows pushbuttons on the right to be read.

The Atari inputs are obtained a little differently. A second annunciator (number 0) must be "on" when input is to be read from the left side and "off" when input is to be read from the right side. The table shows all the combinations of this switch.

Atari Mode Function Selection

Controller Select Switch Setting	Annunciator #1	Button Ø $C061 – 16287	Button 1 $C062 – 16286	Button 2 $C063 – 16285
Left	On	Fire-1	Up-1	Down-1
	Off	Fire-1	Left-1	Right-1
Right	On	Fire-2	Up-2	Down-2
	Off	Fire-2	Left-2	Right-2

Controller Select In Middle

Annunciator #0	Annunciator #1	Button Ø $C061 – 16287	Button 1 $C062 – 16286	Button 2 $C063 – 16285
On	On	Fire-1	Up-1	Down-1
	Off	Fire-1	Left-1	Right-1
Off	On	Fire-2	Up-2	Down-2
	Off	Fire-2	Left-2	Right-2

Atari mode function selection. With the annunciators and the controller select switch of the Joyport set as shown, locations $C061-$C063 will indicate a movement in the specified direction.

```
]BLOAD INVADER.MACH
]CALL -151
*168E:90
*16D5:90
*12FF:20 01 60 10 04 A0 AA EA EA
*6001:AD 5A C0 AD 62 C0 10 0A
*:AD 63 C0 10 08 A4 1A A9
*:7F 60 A9 00 60 A9 FF 60
*3D0G
]HOME
]BSAVE INVADER.MACH (JOYPORT),A512,L24100
```

Listing 1. Patch that will let you play Creative Computing's Super Invader *with an Atari joystick using Sirius Joyport.*

Software Compatiblity

As you can see, a program must be written specifically to take advantage of the Joyport, or it must be modified to do so. I have succeeded in modifying a few of my shoot-'em-up games to accept input from the Atari joystick, and am quite pleased with the results.

Listing 1 shows the steps necessary to convert Creative Computing's *Super Invader*. You may wish to check the starting address of your version by typing: PRINT PEEK(-21902) + 256 * PEEK(-21901) after you have BLOADed the program. If the result is 512, you can follow the steps as shown in the table. If the address is 768, save the modified version by typing BSAVE INVADERS (JOYPORT),A768,L24100.

Sirius is currently marketing several games that may be played with an Atari joystick connected to the Joyport. These include *Gorgon, Copts and Robbers, Outpost, Hadron, Snake Byte, Twerps and Borg*. Gebelli's *Horizon V* may also be played with an Atari joystick by typing control-shift-p at the beginning of the game. Sirius has sent free Joyports to some of the major game publishers, including On-Line and Broderbund, in order to encourage development of compatible software.

The Joyport has a suggested retail price of $74.95 and includes a copy of *Computer Foosball* (1-4 players).

It should be emphasized that although the Sirius Joyport and Astar Octa Stick both accept input from a switch-type (Atari) joystick, they are not interchangable. (See Octa Stick review below).

Astar Octa Stick - II

The Octa Stick II is an interface for using an Atari-type joystick with an Apple. As mentioned above, this type of joystick is either completely on or off in a direction and, if pushed diagonally, can activate two switches.

The heart of the mechanism is a small

interface consisting of a 16-pin DIP plug, a male receptacle for a DE-9 Atari joystick plug, some resistors and relays and two trim potentiometers.

Since this type of joystick returns only three values in each of two directions (center, up, down or center, left, right), the center value may have to be adjusted so it does not look to the program as though the joystick has been pressed. "Normally" the three values returned are 0, 127, and 255. However, a program written for both continuously variable as well as switch-type joysticks may be written to accept the values 100, 120 and 140 indicating directional movement. For a program of this sort, it may be necessary to adjust the center (off) value of Octa Stick.

It should be emphasized that although the Octa Stick interface and Sirius Joyport both accept input from a switch-type joystick, the output to the computer is quite different. Octa Stick puts out three resistance values which can be thought of as simulating the left, middle and right position of a potentiometer-type joystick. Games written for the Sirius Joyport cannot be used with Octa Stick while games like *Thief* and *Snack Attack* work well with Octa Stick but not the Joyport.

The Octa Stick-II interface has a sticky back permitting it to be mounted on the side of the Apple. Unfortunately, the cable is only six inches long which means that if Octa Stick is one's only interface, it must be mounted well to the back of the Apple case. However, if it is used in conjunction with an extension port it can be mounted toward the front right of the case.

In summary, we found the Octa Stick interface with a Newport or Atari joystick considerably better than potentiometer-type joysticks for playing the Pac-Man and Berzerk families of games.

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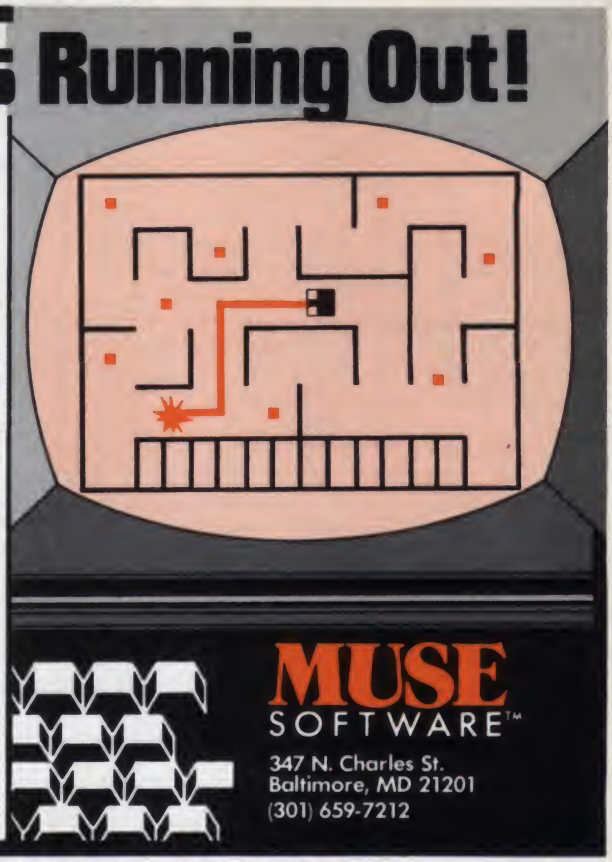

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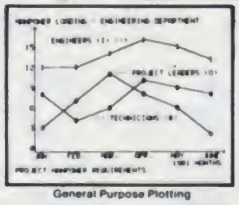
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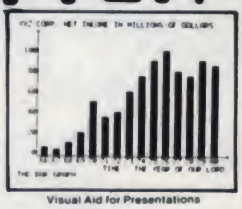
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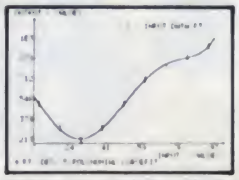
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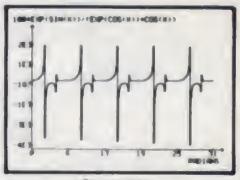
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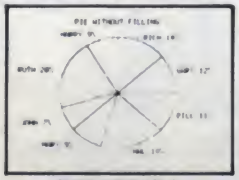
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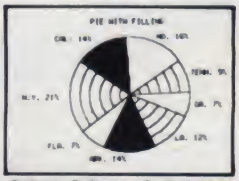
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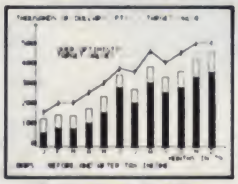
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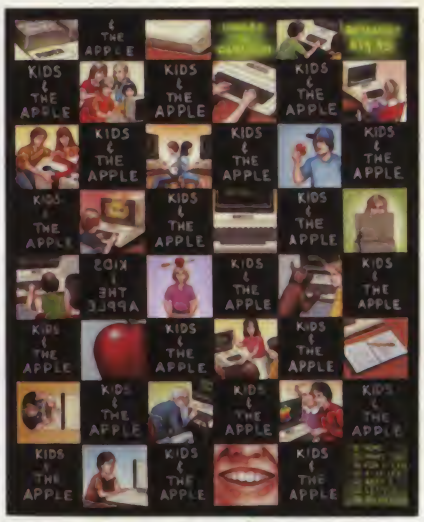

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Keys to Success

Mike Coffey

How would you like to type whatever you want and have a machine remember it? Would you like to type any word and have that machine tell you everything it knows about it?

Imagine underlining the most important words in a letter and asking a secretary to file it. If you underline more than one word, the secretary may file a copy of the letter under each word, or may file the original in one place and a note, referring to the letter, under each of the other underlined words.

A keyword database program can play the role of the secretary in the above scenario. You type anything at all into the computer and, instead of underlining, you stroke a control key to indicate which words are *key* words. The computer will save your text on disk and will enter your key words into an index, enabling it to retrieve the text quickly at your command.

We reviewed three keyword database programs and found them all quite interesting. They all allow free-form text entry with full cursor movement. They all can very quickly retrieve information based on a key and they all are fairly easy to learn and use. They all work on Apple II computers and two of them also work on other computers.

The differences among the programs have to do with their operating environment (what you need to have to use them), their relationship to other programs you may use and the degree to which they support or encourage preformatting of data.

Datafax

Datafax by Link Systems, of Santa Monica, California, is designed for the USCD Pascal environment. You can use *Datafax* on any Apple II with 64K of memory. The program is designed to use two floppy disks, but can be used with just one drive.

The program can make full use of a hard disk, disk emulator in RAM and almost any other peripheral that works with Apple Pascal. Link Systems has promised versions of this program in IBM PC and Apple III formats, though we have not seen either of those.

With *Datafax*, you organize your information into *folders*, storing or recalling a folder's worth of information in each operation. You can type anything at all into a folder, filling as many pages as you like.

Datafax generally uses a one-line menu to tell you which commands you can use. Most commands are invoked by stroking a single key. The main menu lets you move from folder to folder using commands like E to examine folders, S to scan through several folders, P to print the contents of folders, D to delete folders, and N to create new folders.

Let's look at some of these operations in more detail. If you have stored information about all your favorite trees, you could press "S" for scan and then type the word "oak" to scan through all the folders that are filed under the word "oak." *Datafax* will now consult its index and show you a list of all the first lines of all the folders it found.

This list of first lines now acts as a menu. By stroking a single key, you can bring any of the chosen folders into full view. Also by stroking a single key, you may copy, print or delete any of the chosen folders. Best of all, you can alternate between the menu and the viewing of folders, deleting and printing things after taking one last look at them.

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SOFTWARE PROFILE

Name: Datafax

Type: Keyword filer

System: Apple II 64K, Disk drive
Apple III 128K

Format: Disk II (16 sector) or Disk III (for Apple III)

Language: Pascal

Summary: Best bet for free form filing

Price: $199 (Apple II) $249 (Apple III)

Manufacturer:
Link Systems
1640 19th St.
Santa Monica, CA 90404

If you choose to read the folder, you may add text to it or change anything in it and send it back to the disk either replacing or coexisting with the old folder.

Editing Folders

Datafax includes one of the best screen editors available today. Like those in the other two programs, it can insert and delete characters and lines and it does so with single-key commands. Unlike the other programs, the *Datafax* editor can be redesigned by the person using it. If you don't like typing ctrl-P to move the cursor up and ctrl-L to move the cursor down, you can change those commands to suit your taste.

There are just a few unfortunate drawbacks in the *Datafax* editor. The "insert character" and "insert line" commands can cause characters to be lost from the end of the line or screen. To mitigate this effect, *Datafax* warns you when you are about to lose a line, forcing you to confirm your intention before completing the operation.

Datafax allows a folder to contain more than one screen full of text and its editor includes commands for inserting, deleting and copying screens. The major limitation is that, unlike a word processor, *Datafax* does not carry you automatically from the bottom of one screen to the beginning of the next. The other big problem is that you can not incorporate screens from several different folders into one folder.

Here's The Key

When typing your text you can establish a word as a key by pressing one control key after typing the word. You can also back up and turn any previously typed word into a key word using the same control key. If the desired word does not actually appear within your text, you can summon the key-menu which lets you review your key selections for a folder and add or delete keys. You may establish as many keys as you like for each folder.

Summary of Datafax

Datafax fits my design of a key word database perfectly. All I want is a full-screen editor and a keyword retrieval method. I want a program that is easy to use and that can cooperate with other programs. *Datafax* performs the assignment elegantly.

Datafax Scan command.

Visidex

Visidex, published by Visicorp, is designed for the standard Apple II Plus with a disk drive. You can use a printer with *Visidex*, but forget about hard disks, 80-column cards and other high performance peripherals.

Visidex offers a few enhancements to the basic idea of a key word database. It includes a calendar that allows you to file data under a key date instead of (or in addition to) key words. The Visi people also provide the means for designing and using *templates* which are outlines for data that you fill in later.

With *Visidex*, you organize your information into screens; there is no analog to the idea of a folder. The operation of *Visidex* is divided into several modes, each of which is characterized by the set of operations which appear in its menu. Most of the time, you will find yourself in edit mode, two keystrokes away from any other mode.

In Edit mode, you may type any text you like and move the cursor all over the

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SOFTWARE PROFILE

Name: Visidex

Type: Keyword filer

System: Apple II 48K, Disk drive

Format: Disk II (16 sector)

Language: 6502

Summary: Extremely versatile

Price: $250

Manufacturer:
Visicorp
2895 Zanker Road
San Jose, CA 95134

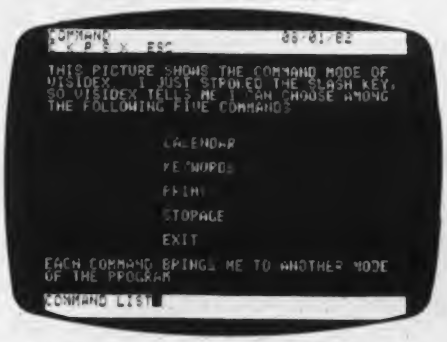
place. You may insert and delete characters and lines but you must be careful with the insert commands. *Visidex* will push the last line off the screen whenever you insert a new line. Any text on that last line is gone forever.

The editor can also erase the whole screen, move to tab stops, invert or flash letters, rearrange lines and establish key words. Finally, you can read lines from text files, but we found this feature awkward and difficult to use.

To create a key word, just press ctrl-K after typing the word. You can also summon the key word mode and enter the key word without actually typing it into the text.

To rearrange lines of text you must delete the lines one-by-one, then undelete them. This scheme is very convenient for

Visidex Command Mode.



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moving a single line, but for moving arbitrary blocks of text, it drags.

You can read a line from a standard text file by pressing ctrl-R. However, if you try to read more lines than the text file contains, *Visidex* makes a non-recoverable error. Since there is no way to know when you have reached the end of a file, we found this feature useless.

Templates

If you get tired of the freedom of full-screen data entry and yearn for the structure of business forms, design some templates. Just type a sample form and use black-on-white format to type the permanent parts of the form. (*Visidex* has control keys to switch between black-on-white and normal typing.) Save the form with a name that begins with a number sign (#) and *Visidex* will remember the form.

When you want to use the template, simply retrieve it from disk and fill it in. When you have finished filling it in, *Visidex* will save it without the number sign (thus distinguishing the blank form from the filled in ones) and provide a fresh, blank form for you to complete.

Heavy Dates

If you file a screen under a date, *Visidex* will automatically show you that screen if you boot the program on that date or within six days after it. You can also ask for advance warning of up to 15 days. Finally, *Visidex* can remind you of daily, weekly or monthly tasks.

Summary of Visidex

If you want to keep track of a floppy disk worth of short notes and forms, Visidex can do the job. For multi-page forms and documents, look elsewhere. We especially like the fact that the program supports but does not mandate templates. Our primary complaint: The command structure is somewhat difficult to master.

Cardbox

Cardbox is published by Caxton Software, of faraway England. *Cardbox* requires the CP/M operating system and an 80-column screen. You may use a standard video terminal or one of the popular 80-column cards for the Apple.

Cardbox works best with two disk drives, though one will suffice. The more storage you have per disk, the better off you are, since *Cardbox* can handle very large files. Cardbox will use any disk drive or printer that is properly connected to your CP/M system.

With *Cardbox*, you organize your data into *records*, which resemble pre-printed index cards. You fill in the blanks on the cards, file them and flip through them, much as you would in real life.

Cardbox uses a split-screen technique for operator interaction. In the bottom section of each screen, you find instructions, on what to do next. Usually, you have the choice of two-letter commands. Each two-letter command stands for a longer English word, e.g. ADd, DElete, INclude, EXclude.

Designing Cards

Before storing any information, you must tell *Cardbox* the format of your pre-printed index cards. Beginners will find the card design process somewhat intimated. This is partly due to the wide variety of options available.

With Cardbox, you organize your data into records, which resemble pre-printed index cards.

Each card is divided into rectangular areas called *fields*. You must tell *Cardbox* five facts about each field: the start position, end position, name, caption and index mode. When you are finished defining one field, press the escape key and repeat the process for another field.

To establish the start position, move the cursor to the desired location and press S. For the end position, move the cursor and press E. To set the field name press N and type the name. The caption (which, unlike the field name, will be displayed during most operations) is entered by pressing C and typing your caption.

creative computing

SOFTWARE PROFILE

Name: Cardbox

Type: Keyword filer

System: 48K CP/M, version 2 or later
Disk drive, 24 x 80 video display.

Format: 8" single density, Apple CP/M, Osborne, etc.

Language: 8080

Summary: Best bet for templates

Price: $245

Manufacturer:

Caxton Software
10-14 Bedford St. Covent Garden
London WC2E 9HE England

You use the *index mode* option to help *Cardbox* determine which words should be key words. To force all words within a field to be key words, use *All*. To prevent any words from becoming key words, use *None*. To leave it up to the operator, use Man or Auto. The difference between *Man* and *Auto* is that *Auto* assumes that each word is a key word until told otherwise, while *Man* assumes the opposite.

Editing Cards

Editing text with *Cardbox* goes as smoothly as it does with the other programs. You are restricted to a single page per form. *Cardbox*, unlike the other two programs reviewed here, never threatens to lose a character at the end of the line or page when inserting. It is also the only one that does not move a whole word from the end of a line to the beginning of the next line when it gets to the right margin.

In addition to four-way cursor controls, *Cardbox* includes keys for moving to the beginning or end of a field, next word,

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CIRCLE 223 ON READER SERVICE CARD

previous word, and next field. While typing, you may insert or delete characters but not whole lines. You can establish or disestablish a key word with a single stroke.

Flipping Through Cards

When you are not editing a card, you can scan through your cards using the *Move To Next Card* and *Move to Previous Card* keys. You can also use the *Move to Last Card* and *Move to First Card* keys.

If you have many cards in your file, a one-by-one scan takes a long time. To help speed things up, *Cardbox* provides the Select, Include and Exclude commands. Let us use another example from the world of trees.

If you want to look at only those cards that contain the key word "oak" just type SE /OAK and press the return key. Now you can scan forward and back among only the cards in which *Cardbox* found the key word "oak."

You can further restrict the cards to be scanned by giving another Select command or by giving an Exclude command. If you want to concentrate on oak trees other than American Oak, you might type EX /American, for example.

The Include command serves to expand the collection of selected cards. After saying SE /Oak, as above, and IN /Maple we can scan through all cards having either oak or maple as key words.

For those occasions when you forget to make key words where you should, *Cardbox* has special versions of Select and Exclude (but not Include) which search all text in your cards, not just the key words.

To help the sophisticated searcher, *Cardbox* offers commands called Back and Clear which undo your selection commands one at a time or in one big gulp. Also helpful are the History command, which tells you how you managed to select your current set of cards, and the Listindex command, which helps predict the effect of a Select command.

Deciding

Ask yourself the following questions: Do I consistently use data in fixed formats? What else am I using the computer for? What kind of memory devices do I use?

Cardbox forces you to predefine your data formats. *Datafax* provides no support for preformatting. *Visidex* can go either way.

Cardbox can create data files for use with many standard CP/M word processors and other programs. With *Datafax* you can make Pascal editor and program compatible files. *Visidex* has limited capabilities of this type, but can make Apple DOS text files.

Datafax and *Cardbox* can both make full use of hard disks, 8" floppies and disk emulators in RAM when such peripherals are correctly installed. *Visidex* has no such capability.

Final Words

I can't close without mentioning documentation and on-screen help. Each program comes with a very good manual, although the *Cardbox* manual is a bit difficult for beginners. *Visidex* includes a superb reference card and the *Datafax* manual, though good, is labeled "preliminary."

Each program displays help in a different way. *Cardbox* is very talkative, *Visidex* is terse and *Datafax* is professional sounding.

I prefer the *Datafax* style of spelling out each available command at the top of the screen. The *Cardbox* screen seemed a bit too busy, with messages changing between keystrokes so often I was sometimes distracted. *Visidex* is a bit too terse for me, providing only single-letter clues as to what I could do next.

Don't be afraid to try any of these programs. Remember: If you can't deal with it, file it. □

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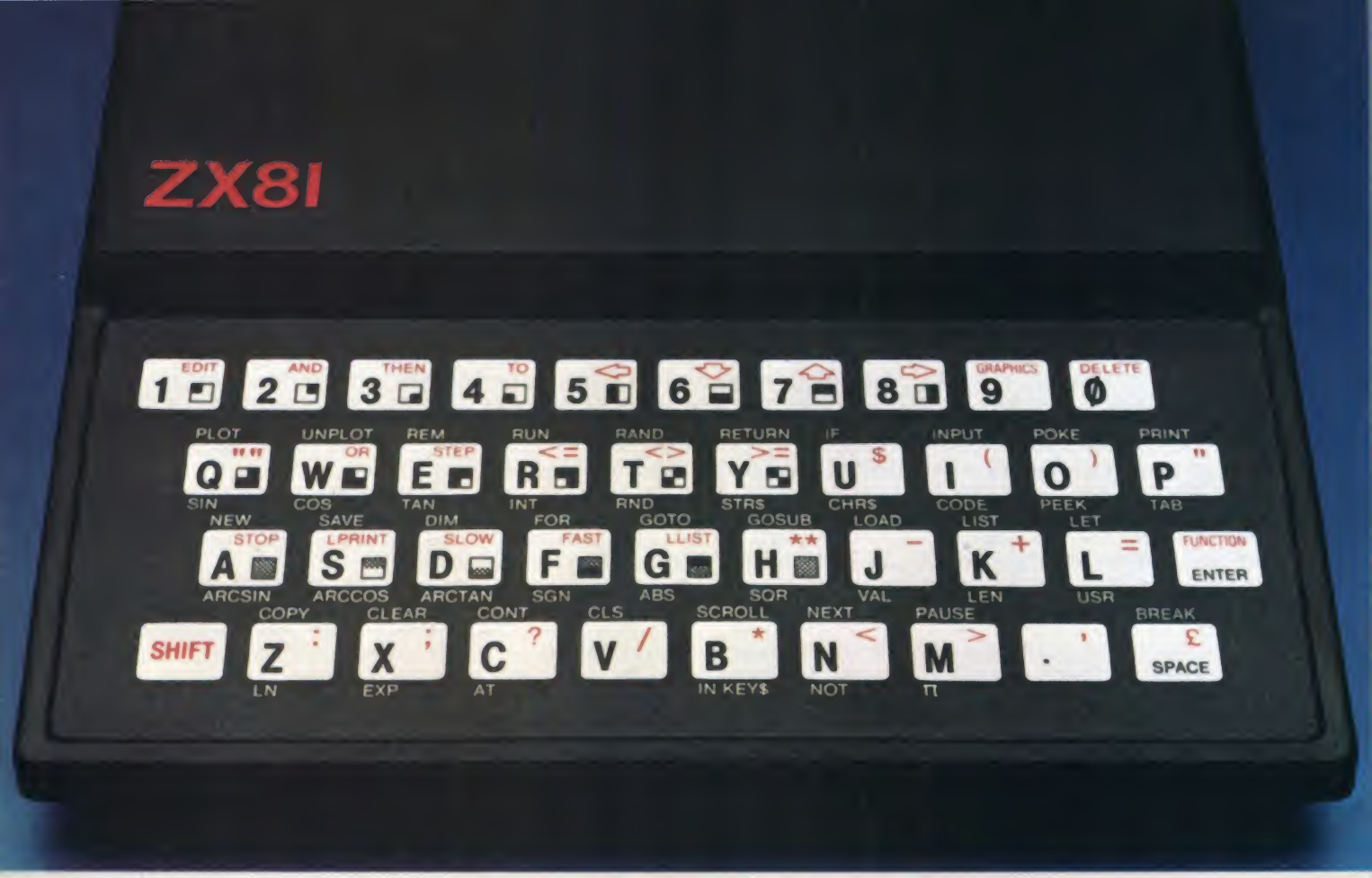
CIRCLE 107 ON READER SERVICE CARD



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CP-202C

creative computing software evaluation

Record Players

Mike Coffey

When you buy a file manager, you are really buying several programs, to wit:

- Record designer
- Record editor
- File printer
- File sorter

Each program within a file manager can be evaluated separately for ease-of-use, generality, speed, error protection, documentation and whatever else you think is important. To summarize these into an overall evaluation would be a difficult, enemy-making and otherwise meaningless task.

Thorough analysis of all the worthwhile file managers on the market would fill a book with as many pages as any two issues of *Creative Computing*. This article will analyze the functions of each program within a complete file manager and cite examples from two popular systems.

Both *DBMaster*, from Stoneware Microcomputer Products, and *Visifile*, from VisiCorp, are complete file managers that you can buy from almost any Apple dealer. They are generally well documented and carefully debugged. We do not mean to imply that they are necessarily the best file managers. You must analyze your needs and choose the system that best fits you.

Record Designers

Building a file begins with designing the layout of the data to be stored in the file. We will use a simple mailing list file as an example.

If some parts of the design puzzle you, you have been effectively introduced to the world of record design.

For each person or organization, we may need to keep track of the following things: name, address, phone numbers, and birth date.

For the sake of the program we must state our design more specifically than we did in the previous paragraph. We must specify the record design as a collection of *fields*, each of which can hold a simple sequence of characters, often restricted in number and type of character.

Figure 1 shows our refined record design for the simple mailing list.

If some parts of the design puzzle you, you have been effectively introduced to the world of record design. Many books have been written on the topic.

Any decent file manager will let you specify the length of fields and whether each should hold letters and numbers (alphanumerics) or numbers only. Many file managers, including *DBMaster*, also

Figure 1.

Name of Field	Type of Characters	Number of Characters
Last name	any	up to 20
First name	any	up to 20
Street address	any	up to 40
City or town	any	up to 20
State	letters	2
Zip code	numbers	5
Day phone	(xxx)yyy-zzzz	8-13
Night phone	(xxx)yyy-zzzz	8-13
Birth date	mm/dd/yy	8

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CIRCLE 175 ON READER SERVICE CARD

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SOFTWARE PROFILE

Name: DBMaster
Type: File Manager
System: Apple II 48K, 2 Disk Drives (or more)
Format: Disk II (16-sector)
Language: Basic & 6502
Summary: Maximum Power
Price: $229
Manufacturer:
Stoneware
50 Belvedere St.
San Rafael, CA 94901

can handle specially formatted fields, such as dates.

When you tell *DBMaster* that a field should contain a date, it creates an eight-character field with hyphens to separate month, day and year. The operator will be able to type only numbers into the field, however, *DBMaster* will not reject dates like 99-32-82.

Visifile recognizes numeric and alpha-numeric fields. For a date, you would specify an eight-character alphanumeric field. The operator(s) might have to learn to be careful about how they type dates.

DBMaster knows about numeric, alpha-numeric and several kinds of fields. Here is a list:

- Counting numbers (0-255)
- General Integers (+/- 32767)
- Decimal numbers (9-digit precision)
- Dollars and Cents (up to $9,999,999.99)
- Social security number (xxx-xx-xxxx)
- Telephone number (xxx-xxx-xxxx)
- Yes or No

Record Capacity

Next on our list of considerations are record length and field length. Figure 2 shows how our two programs compare.

You can see that *DBMaster* enjoys greater record capacity, but that *Visifile* would be preferable for people with a few long fields. Either program works fine for our mailing list.

With a little practice, you could probably make money setting up people's files for them.

The Record Design Process

The record design program should make your job easy, keeping you informed of your options along the way and allowing you to back up, correct mistakes or change your mind. Most programs fail to do this.

DBMaster puts the designer through a long, confusing and, therefore, error prone dialogue. Beginners should seek help from an experienced friend the first time they design records.

creative computing

SOFTWARE PROFILE

Name: Visifile
Type: File manager
System: Apple II 48K, Disk Drive (2 recommended)
Format: Disk II (16-sector)
Language: Basic and 6502
Summary: Good menus
Price: $250
Manufacturer
Visicorp
2895 Zanker Rd.
San Jose, CA 95134

Figure 2.

	Maximum Record Length	Maximum Number of Fields	Maximum Character Field Length	Maximum Numeric Field Length
DBMaster	1020	100	30	11
Visifile	232	24	128	38

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CIRCLE 214 ON READER SERVICE CARD

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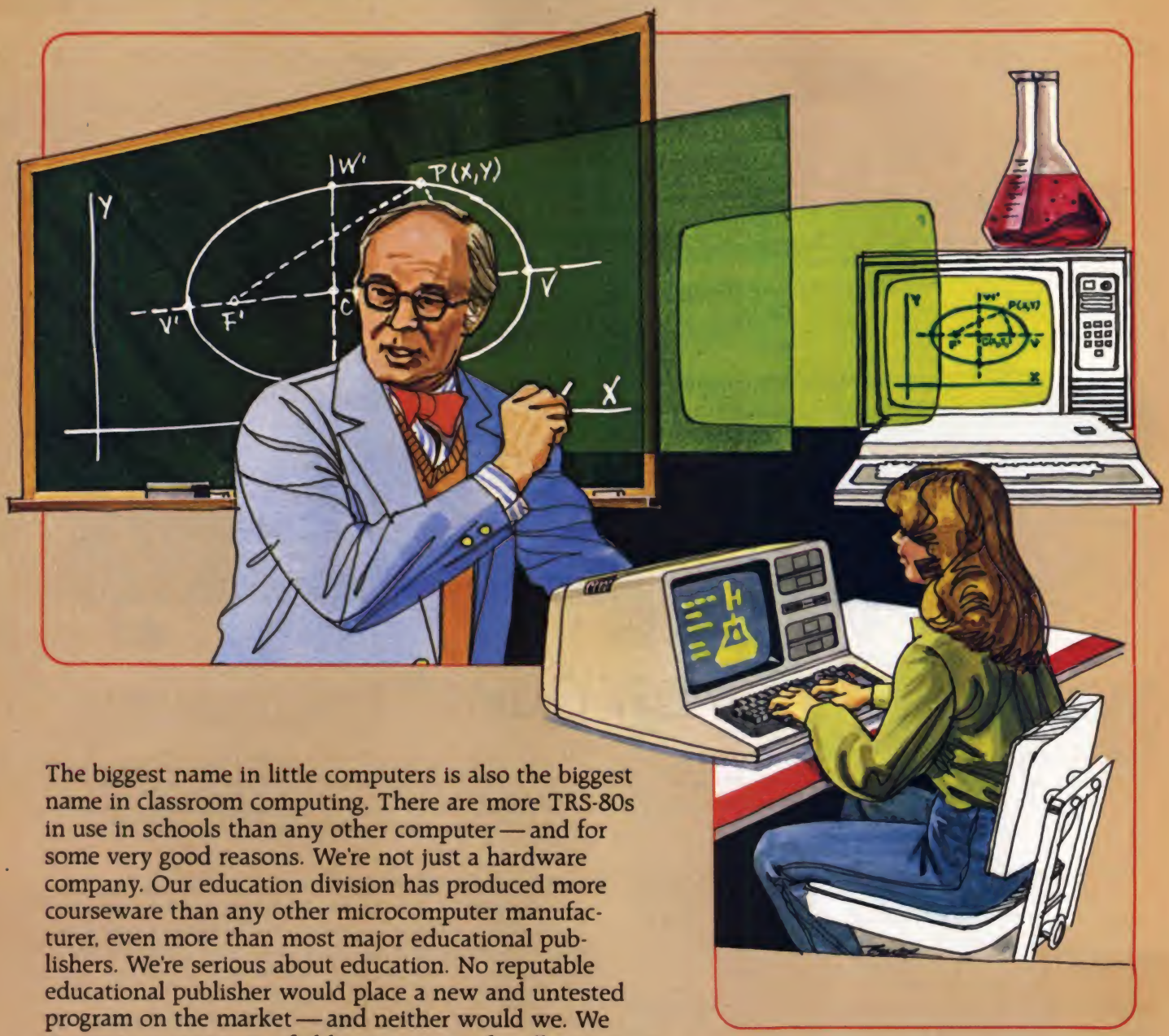

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CIRCLE 264 ON READER SERVICE CARD

Visifile employs a very easy to follow design procedure. You will seldom wonder what to do next, especially if you read the manual. The program always displays a not-too-cryptic list of options and your work in progress is fully visible.

As for redesigning old records, *Visifile* lets you start again from scratch and then copy data from the old type records to new ones. *DBMaster* will not do that unless you purchase the optional *Utility Pak* #1.

Summary of Record Editors

DBMaster has one of the most powerful and complex designers you can buy. With a little practice, you could probably make money setting up people's files for them.

The *Visifile* record editor, while simple to operate, offers fewer options. We recommend this type of record designer to beginners and to people whose files will be used by only one person.

Record Editors

Most people spend most of their file management time editing records. Therefore, consider carefully the qualities of the record editor of each system.

Under record editing we include both generating new records and altering old records. Some systems treat these as separate tasks but we have a hard time keeping them very far apart in our mind.

We think of record editing as a specialized form of text editing. We wish that the designers of file management systems felt the same way. Commands to insert and delete characters, words and lines are just as useful in record processing as they are in word processing. Unfortunately, most of these commands are missing from many file managers, including both *DBMaster* and *Visifile*.

Complete cursor controls can also add much to the convenience of a system. Most file managers, including *DBMaster* and *Visifile*, fail to satisfy this wish.

Record editing, like text editing, involves very subjective concerns about what feels right to an individual. Be sure to try out each system before buying.

Visifile Main Menu.

DBMaster Main Menu.

DBMaster Record Editing

In *DBMaster*, you reach for the record editing functions from the main menu by selecting "add new records" or "search/print/update." When you have searched out the record you wish to edit, pressing the escape key alows you to change its contents.

Whether you are adding or modifying a record, *DBMaster* lets you move sequentially from field to field and from page to page (if the record has more than one page) and retype any field.

If you suddenly decide you don't need a record, you may delete it.

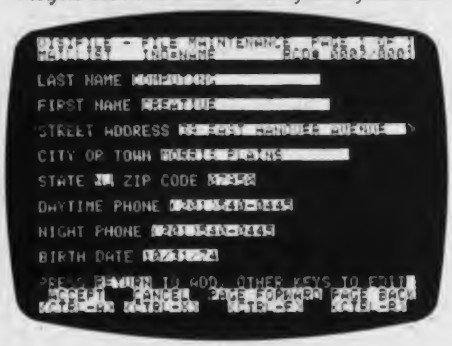
Visifile is built around several cursor driven menus.

Visifile Record Editing

Visifile is built around several *cursor driven* menus. At the bottom or top of the screen you see several choices. Touching the cursor keys causes each choice in turn to be highlighted. When you have highlighted your choice, just press return and it's yours.

Adding records is as simple as can be: just select Add and fill in the fields.

Visifile Record Editor with fields filled in.



DBMaster Record Editor.

Correcting mistakes is no problem, just back up and retype.

Changing records can be a bit weird, though. When you select Change from the menu, the program asks which record to change. Normally, it asks you to tell it the record number of the one you want to change. In the *index mode*, however, it asks for the key value of the one you wish to change.

We would prefer a *Visifile* with only one mode. The record number method of record selection should have been discarded before the product was released. It does little to enhance the utility and much to complicate its use.

Because of the availability of two different modes, the operator must remember to throw the system into "search index mode" whenever starting the record editor.

Now, back to our editor. Choose "Change" from the menu and enter the key value of the record you wish to change. Oops, we're stuck again. What's a *key value*?

Before you can use the search index mode on a file for the first time, you must sort the file. In its simplest form, sorting involves choosing one field as the key field. The program then creates a special file, called an index, that tells where each record would be if the data file were arranged in alphabetical order according to the contents of the key field. Simple, right?

Now more about our editor. You have typed a key value. *Visifile* shows you a record that matches your key. You can retype any field, inserting and deleting characters at will. Finally, you press a control key signalling that you are done editing, and *Visifile* returns you to the maintain menu.

You delete records in similar fashion. Choose Delete from the menu and enter the key value. *Visifile* will display the corresponding record and ask for confirmation before deleting it.

Try It Out

Let's emphasize once again that the record editing program is the most important component in the file manager sys-

The record editing program is the most important component in the file manager system.

tem. Make sure that the program feels right to the person who will use it most often.

Printing

File printing can be divided into two steps: designing report formats and printing reports. Generally, you can design a format once and use it many times.

DBMaster can print without having you create a report format. Just choose "List records to printer" from the main menu. You will then be able to specify which records should be printed. You will not be able to specify which fields should be printed, *DBMaster* will print them all.

You can get basic reports from *Visifile* very easily also. The first time you print a report from a given file, you must design a report format for that file. For subsequent reports you may reuse the same format or you may design and use additional ones.

Visifile Report Design

When designing a *Visifile* report you specify:

- Report name.
- Printed title (up to three lines).
- Length of a page.
- Whether to print in key order.
- Whether to print deleted records.
- Whether to print the names of fields.
- Which fields to include and where to place them.

All except the last of these are shown on the first screen of the Report design dialogue. You can easily back up and change your mind, and you can always see what you have done so far.

The second screen of the dialogue covers the details of the choice, placement and appearance of fields. Again, because of the menu orientation and the ease of correcting mistakes, this process is simple to master.

With all these specifications tucked away in the print format, there are still two options that can be selected at print time: which records to print and in what order.

The easiest thing to do is to print all records. Otherwise, you can use yet another specialized menu to weed out certain records. Just select the fields you want to consider and the characters you want to look for in each field.

The order of printing is determined by the sort command, described in its own section, below.

DBMaster Report Design

DBMaster also has a Report Design program. It has many options, is difficult to use (especially the first time) and its explanation requires 35 pages in the *DBMaster* manual. Features include page number placement, date of report, number of lines between records, comment lines, column titles, computed fields, row totals, column totals, sort fields, subtotals, and which records to include.

File Sorters

Sorting a file usually means arranging its records in alphabetical order so that a human can find one quickly. Computers sometimes sort files so that they can find records quickly, but they also have other quick search methods.

DBMaster, for example, uses keys and indexes to find records quickly and only sorts when you ask for a sorted report. *Visifile* also uses keys and indexes and, if you are careful, can keep everything in order as you add new records.

Sort of DBMaster

DBMaster can consider up to six fields in one sorting operation. Examples are fun to imagine. You can print a list of people according to country and, within country, according to state, and within state, by county or parish, city or town, postal code, or street. This is very useful for statistical researchers, especially since *DBMaster* can add up columns of numbers within each of the sort levels.

For quick retrieval of records (within about five seconds for even full-disk sized files), *DBMaster* uses *secondary keys*. When you tell the program that you want a particular field to be a secondary key, *DBMaster* quietly creates an index file for that field.

The secondary keys of *DBMaster* obviate the need for a separate sorting step (except for printing.) Instead, the storing of each record takes a bit longer. In many cases, the difference will not be noticeable. The *DBMaster* manual suggests using no more than three secondary indexes at the same time.

Sort of Visifile

Visifile can consider up to ten fields in one sorting operation. When you sort with *Visifile*, the program builds an index file, to which you give a name.

Visifile uses this index both to print sorted reports and to help find records quickly for editing. You can build more than one index file (each using a different set of fields), but switching among them requires re-sorting using the Sort menu.

Capacity and Overhead

Visifile, like most file managers you can buy for the Apple II, can manage files as large as the capacity of one Disk II (approximately 120K). *DBMaster* can handle files as large as a million bytes. However, as soon as your file exceeds 140 kilobytes, you will have to begin swapping disks as *DBMaster* commands you, unless you have the hard-disk version.

Each program requires 48K RAM and a disk drive. Both publishers state that their programs work with a single disk drive. Only a masochist would use either program with a single drive. *DBMaster* works best with three drives (one for records, one for indexes, and one for the program), though two are adequate for most users. *Visifile* works best with two disk drives and will ignore any additional drives.

Both systems handle printers of most types. Neither supports 80-column boards nor other non-printer peripherals. Hard disk compatibility is another desirable, hard to find, feature. Special versions of *DBMaster* have it, most others do not.

Summary

As I said at the beginning of this article, there is no way to summarize this topic. So get going, analyze your needs and try a couple of systems yourself. □

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Bob Louden, InfoWorld, December 7, 1981:

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Dona Z. Meilach, Interface Age, May 1982:

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Eric Balkan, The Computer Consultant, Vol 2 No 9:

"As a reviewer, I'm impressed the most with the imagination that went into this product. With all the me-too software on the market, it's good to see something original come out. It's also good to see that the program author allowed the user as much freedom as he did — you can use your own imagination to extend the uses of the program."

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Form Fiddling

Mike Coffey

creative computing

SOFTWARE PROFILE

Name PFS: The *personal* filing system

Type: Forms Filer

System: Apple II 48K, Disk Drive (2 recommended) or Apple III 128K, extra drive (Disk III or hard disk)

Format: Disk II (16 sector)

Language: Pascal

Summary: Elegant, efficient, beautiful

Price: $125 (Apple II), $175 (Apple III)

Manufacturer:
Software Publishing Corp.
1901 Landings Drive
Mountain View, CA 94043

I have used many programs and manuals that load me down with jargon, promise mainframe power and leave me wondering why I bought a computer in the first place. The *PFS:* series from Software Publishing Corporation does just the opposite.

PFS is an ideal database management program for a first-time computer user. There is no cumbersome command language to master, the menus are few and simple, and the terminology is based on simple English.

Overview

PFS data is organized as a collection of forms. A *PFS* form works like a preprinted business form: you design the form once and fill it in many times.

Once you have designed your form and filled in a few, *PFS* lets you review, remove, change, or print them selectively. All these options appear on the main *PFS* menu.

Form Design

PFS incorporates the simplest form design process we have seen. Just move the cursor to the spot where you want the name of the item to appear and type the name of the item, followed by a colon. Repeat that process for each item in your form.

When you are finished, press a single control key and *PFS* does the rest. It will initialize your disk and record your file name and form design on it. If you change your mind about initializing the disk, just press the escape key to bail out.

While typing item names, you can flip to the next or previous page of your form using a control key. You can also erase a whole page if you make such a mistake and you want to start over.

Filling in Forms

When you want to add or change the contents of forms, you use the limited function editor that is built into *PFS*. You can move the cursor up, down, left and right but you cannot insert or delete characters or lines; you must type over the information on the form. These functions are adequate for original data entry but leave something to be desired when many revisions are necessary.

The editor employs the right arrow key to move to the next item, the control-C combination to conclude the editing process, and the escape key to bail out without saving the changes you have made.

Re-reading Forms

To re-read forms, choose Search/Update from the *PFS* function menu. *PFS* will show you a blank form and ask for a Retrieve Specification. Your job is to tell the program how to find the forms you want to read.

To do this, simply move to any item and type in the information you want *PFS* to find there. For example, if you want to find out about oak trees, move to the Tree item and type Oak.

When you hit the continue key *PFS* will show you all forms that have Oak in the Tree item. Each time *PFS* shows you a form that it found, it waits so you can read and perhaps change the information in the form. While the form is displayed, you may print it or delete it. Finally, when you give the signal, *PFS* continues searching for more matching forms.

Deeper Searching

The retrieve specification can be more complicated, if you wish. For instance, if you just want to learn about all the oak trees in Chicago, type Oak in the Tree item and Chicago in the City item.

PFS can even find things that you don't spell out completely. If you don't know how (or are too lazy) to spell Chicago, just type Chi.. in the City item. *PFS* will find forms that include a city beginning with Chi.

You could also type ...chi... and *PFS* would find anything that had chi in the middle of it. Coffe@ would match either Coffey or Coffee. To find everything that does *not* have oak in it, type /...oak... in the tree item. If you have a numeric item, like age of tree, you can use greater-than, less-than and equal-to signs along with numbers to specify which forms to look at.

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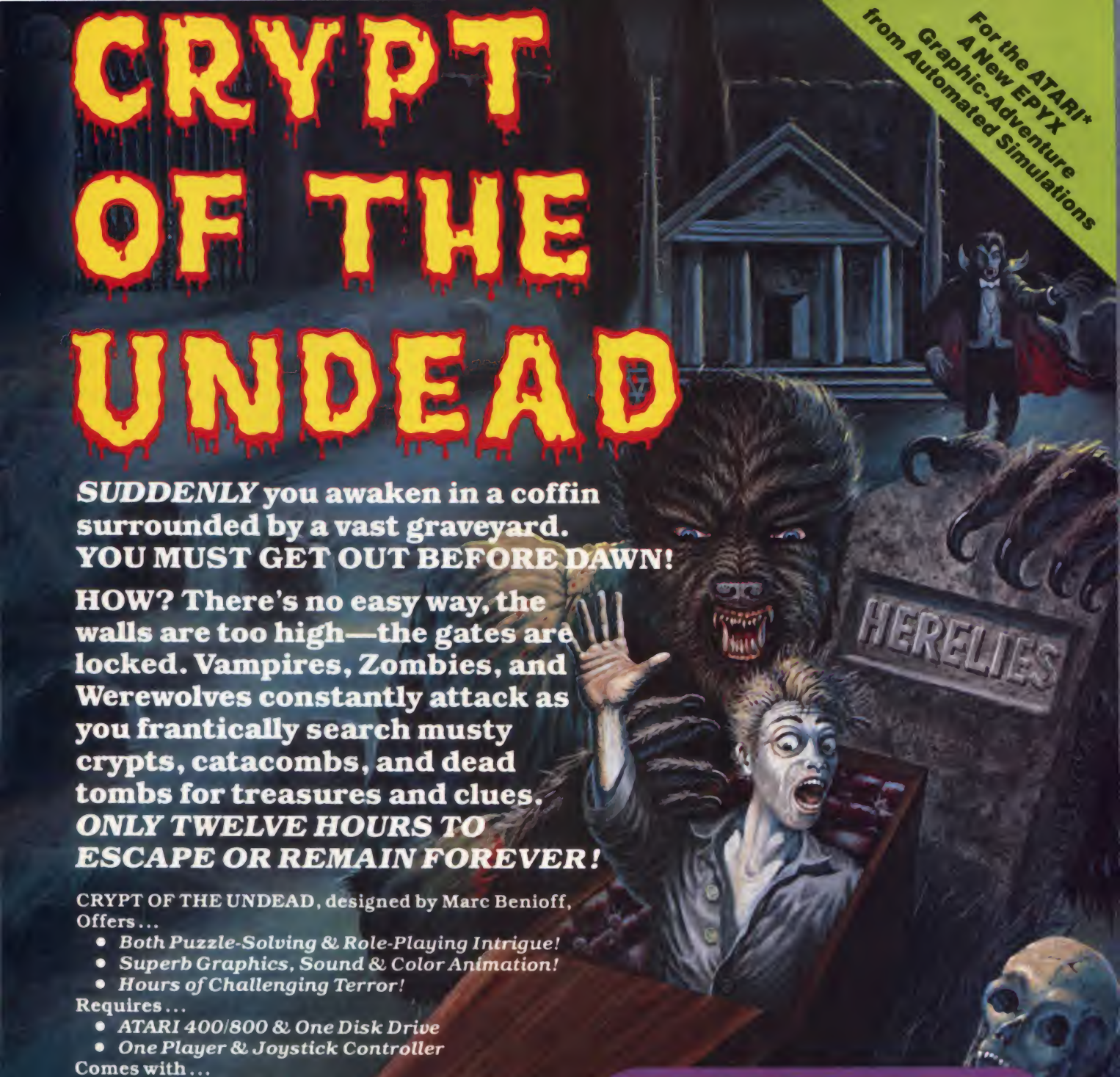

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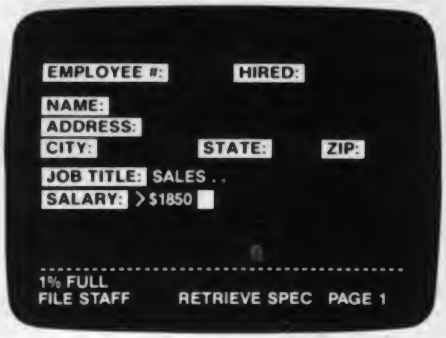

We ask for someone in sales with a salary over $1850...

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Printing Forms

If reviewing your forms on TV does not thrill you, try printing them on paper. Just select "Print" from the menu and *PFS* will show you a blank form.

To show *PFS* which forms to print, fill in the form as if you were searching. Next, you must tell *PFS* which items to print from each form. The program again displays a blank form and asks for print specifications.

You can ask for each item to be printed on a separate line by putting an X next to the name of each item to be printed. By using plus signs instead of Xs, you can get items to share space on the same line. Naturally, you can combine these options.

The latest additions to the *PFS* repertoire of print options are the T and S options. By placing a T next to the + or X for an item, you prevent words from being split at the ends of lines. By including an S next to an item, you tell *PFS* to sort the printed forms in alphabetical order according to the item in which the S appears.

Unwanted Forms

When you want to get rid of forms, select Remove from the *PFS* function menu. As so often happens, a blank form appears, while *PFS* asks for a retrieve specification. When you have entered a pattern to be matched, *PFS* will search through the file and forget any matching forms.

Niceties

Many programs punish you for making mistakes. *PFS* forgives you. If you belatedly discover that you have left some important item out of your design, *PFS* lets you change your design without losing any data.

Another important thing about *PFS* is that it is a completely self-contained package. If you have two disk drives, *PFS* will even copy your data disks for you. You never have to read another manual or run another program to make the most of *PFS*.

Limitations

Lest you think that *PFS* stands for *perfect* filing system, I must mention some of its limitations. There is no way to specify what type of information should be entered into each item. For example, *PFS* cannot force the user to enter a whole number, a date, or a telephone number.

If reviewing your forms on TV does not thrill you, try printing on paper.

The Apple II version of *PFS* stores exactly one file on each data diskette. Consequently, people with small collections of data end up wasting diskettes. People with very large amounts of data, (more than 1000 forms), find that *PFS* cannot handle files larger than one disk's worth.

PFS for the Apple III can place more than one file on a disk and can also use a hard disk for files as large as 32,000 forms (depending on the size of the forms).

Relatives

Software Publishing Corporation maintains an impressive line of software products. Their *PFS: Report* program can make sorted columnar business reports from your *PFS* files. The brand new *PFS: Graph* makes colorful charts based on the data in *PFS* and DIF (Data Interchange Format) files.

Evaluation

PFS is phenomenally simple to learn and use. When combined with the rest of the *PFS* series, it offers a collection of features that compares favorably with most of their database managers in the field. □

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Database Management for the IBM PC

Danny Goodman

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SOFTWARE PROFILE

Name: T.I.M. III, Revision 5 (December 1981)

Type: Database Management

System: 64K IBM PC, Disk drive, monochrome, display, parallel printer

Format: 3 Program Disks

Language: Microsoft Basic

Price: $495

Manufacturer:
Innovative Software, Inc.
9300 W. 110th St., Suite 380
Overland Park, KS 66210

To my way of thinking, applications software, especially packages intended to be "user friendly," should make the computing machine transparent to the user. That is, the user's attention should be focused on the application and not the computer. Just as in adding two numbers on a calculator, you are more interested in getting the result than how the unit's integrated circuit converts, stores, processes, and drives the display during calculation.

With Innovative Software's very flexible and powerful *T.I.M. III* database management program for the IBM Personal Computer, however, the user is reminded a bit too often that there is, indeed, a microcomputer with multiple disk drives in use, and that some care must be taken in executing commands, or keyboard input may be lost at the slip of a key.

The "TIM" in *T.I.M. III* stands for Total Information Management, and in that regard the program lives up to its name. The menu-driven program assists the user in creating electronic files, which can be of great benefit to business and personal applications.

Once information is stored in the files, the user has the option of adding to or updating the file, searching through the file for records which meet user-specified criteria, printing mailing labels from the files, printing or displaying cumulative reports in user-specified formats, and invoking several maintenence and utility services within the program.

For the first-time database management user, some of the terminology may be confusing, even though the ideas behind them are familiar. The three most important concepts to grasp are: file, record, and field.

In the non-computerized world, a file cabinet drawer may be labeled "Customers": this is the "file" called Customers. Inside the drawer are probably file folders, one for each customer, all in alphabetical order. Each folder is the "record" of that customer. Then, inside the folder is information about the customer—name, address, phone, person to contact, etc. Each of these items is called a "field."

That means that the bulky non-electronic file cabinet I just mentioned is sorted according to the Customer Name field: that's the "key field" of the file. By dividing a record into fields, you have the ability to search through an entire file for specific zip code fields, for example. Try doing that with a file drawer of alphabetized files.

The other distressing term to watch for is "library." When creating the format for your records or printed reports (i.e., how the fields are to be physically arranged so they make sense to the eye), the specifications for a given format are stored in a "library."

With these fundamentals out of the way, we can jump into *T.I.M. III*, one of the first database management programs to become available for the IBM PC. The package owes its early arrival to the existence of earlier *TIM* editions written in Microsoft Basic. And, since the resident Basic of the PC is of the Microsoft dialect,

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1. Main menu on disk #1 through which all subcommand menus must be accessed.

2. Help screen for defining fields in a file record.

only minor changes in the program were necessary to duplicate CTRL-(x) sequences on the ten function keys of the machine.

A *TIM* file can hold up to 32,767 records; each record can have up to 40 fields; and each field can have up to 60 characters—in all, a healthy amount of data for a microcomputer to manipulate. System requirements are 64K RAM, one disk drive (though two will be much appreciated by any user), PC-Disk Operating System, IBM monochrome display, and parallel printer.

The *T.I.M. III* program is contained on three 5-1/4" diskettes, labeled Master Disks 1, 2, and 3, plus an Examples disk used in conjunction with a tutorial at the end of the manual. The disks are shipped in a pocket located on the inside front cover of the padded, three-ring binder manual.

Documentation

The documentation is divided into 13 tabbed chapters, plus appendix and four tabbed examples sections. Pages are printed from a typewritten—or rather word processed—original, which is nevertheless easy on the eyes, and uses boldface type for highlights. All material that appears on the monitor is printed in blue, with boldface blue used for characters which are to be input by the user. This two-color, two-weight format leaves little room for operator error.

Indicative of the user friendliness of the manual is that the operator is carefully guided through the process of making a backup set of master disks, including the basic procedure for formatting blank disks with PC-DOS. All subsequent COPY steps are clear and thorough.

After that, the user follows screen prompts through configuration of all disks for printer width (default is 131 characters), available disk drives, number of program disks, his name, address, etc., and printer type. Only the last item is not fully explained, leaving you to figure out what "Optional Printers 1 and 2" might be.

Help screens, menus and prompts abound.

These are all laborious steps for the non-computerist, but fortunately, they are performed only once, and the directions are very easy to follow.

Just when you think all the disk shuffling is behind you, you select the "Create a new file" sub-menu from the Main Menu. You are directed to put disk #2 into the drive. Then you're told to wait while the program is loading.

Sub-programs are grouped such that the most common ones are on Disk 1, but "Create" is on Disk 2, and all file maintenance and utility sub-programs are on Disk 3. To get from Maintenance to Utilities, both on Disk 3, you can go only via the Main Menu on Disk 1. These interruptions break the trance of the application.

Once on the proper program segment, however, *TIM* is very easy to work with. Help screens, menus and prompts abound.

File Definition

When defining a new file, for example, you are prompted for a field title (e.g., "Last Name"), while the help screen above advises that you have a maximum of 15 characters. For that same field, you must then specify the length of the field (the maximum number of characters you expect to "fill in the blank") up to 60.

At each prompt, you are also shown how many characters you have left from a maximum of 2400 per record (but this figure can be misleading, as you will see below).

Other parameters to specify are field type (eight choices including alphanumeric field, numeric field, calculated field that performs arithmetic functions on two other fields, inverted name field, dollar field), precision of a numeric field (0-4 places to the right of the decimal) and even data type (American month/day/year or European day/month/year). At any time in the new file definition stage, you can review the fields you have already created or go back through your entries to correct an error.

To signal the end of your file definition, simply press Return (null string), and you are asked if you are done. My tendency was to press "Y" and Enter—Oh, NO! You are only supposed to hit "Y," after which you are prompted for the file name before it is all stored on disk. But if you hit "Y" followed by Enter, the file name prompt flashes for an

3. Sample blank record. Dashed lines indicate number of characters that can fill the field. Help screen at bottom indicates IBM PC function key actions.

4. Sample record.

instant, and you are back to the Create sub-menu; all previous field specifications are gone.

The difficulty is that most menu commands are executed by simply pressing one key, while other prompts are not consistent—some require Enter, some do not. So, after inputting all the fields with Enter, and even ending the session with Enter, I have Enter on the brain—only to lose a great many keystrokes. This is one of those reminders to a non-techy that you must pay attention to the machine to avoid errors.

Speaking of errors, the program catches most of them, tells you what the problem is, and lets you continue. That's great.

I ran into one occasion, however, where an error stopped the program and returned me to Basic, so I was unable to continue. The problem came when I was defining a new file, a relatively large one at that. The character count on the prompt started at the possible maximum of 2400—but the default maximum is only 650.

Not realizing that I should stop before hitting 1750 (i.e., 650 used) I was defining away, watching the character count drop at each field definition. I then gave the file its name and got an error on line 3440 and a Basic "OK." I couldn't get the program going without hitting F2 (RUN), and thus losing all my work up to that point. There was no clue in the documentation that I might run across this problem.

It is unfortunate that room for such errors comes in the "Create" stage, because this is the first place the user must go when starting to use *TIM*. An impatient user would be disappointed.

On a more positive note, though, *TIM's* user friendliness really shines when it comes to establishing screen formats for records and generating lists or reports.

Custom screen formats can be created with ease thanks to full screen editing. Simply move the cursor to the spot on the screen, call up the field you want, and press a button: Presto! the field appears on the screen in its proper place.

Custom screen formats can be created with ease thanks to full screen editing.

You can put more than one field on a line, provided there is room for all the characters, and leave blank lines between items...really a custom form for each file.

On the IBM, cursor movement is controlled by function keys 1-4, which is a bit awkward if you are used to the scrolling keys on the numeric keypad. The custom screen feature is particularly useful if you want to keep as much data as possible on one screen. Or if an untrained operator is accustomed to established, printed forms the transition to computer entry would be a snap.

Generating Reports and Lists

TIM's list generation is well-suited for printing mailing labels. Again, the flexibility of the program allows for a variety of options, such as specifying 1-4 lists across the page, which and where items (fields) are to appear on the label, spacing between labels, etc. There is also a test print feature which helps you line up the labels properly without printing out data.

In generating reports from data on file, the potential power of *TIM* is evident, but its flexibility only partially so. Screen prompts make definition of the report format fairly easy. Among the "high power" functions you have are the ability to link two files together in one report, and to print subtotals throughout the report (as in sales commission reports).

You are limited, however, in several respects. You're stuck with the titles originally chosen for fields as headings on the report. Secondly, you don't have the ability to create a better looking form with full screen editing as on record formats. This is probably a compromise between too complex a program and a user-friendly approach designed to eliminate as much of the human toil from the job as possible.

Aside from the disk switching, which, admittedly, becomes more transparent as time goes on, the most disheartening feature of the program is the slow speed at which its most powerful features operate. Any shred of hardware transparency disappears when you have to wait for the machine to churn away.

In one 57-record file I used as a guinea pig, a search for a particular record in the pre-sorted key field took 22 seconds, a bit longer than it would take me to dig it out of a file drawer. But if I hadn't been sure of the *exact* entry as originally input on the record (as might be the case if some-

one else had entered the data, adding "Co." or leaving off "Inc."), the program would have had to "look" at the field in every record on file. And when each peek at a record takes a hair over three seconds, well, that really adds up fast: a bit over three minutes for my 57-record file. The same goes for a search through any non-key field, whether you have the exact entry or not.

Speed

Creating lists and reports is also painfully slow. I printed a report of my 57-record file to the terminal only (negating any delay the printer might cause), with a printout of only four fields from the record, in sequence of any key field. It took almost four minutes!

When you consider that an IBM disk can store up to a minimum of 234 records (at the default record length of 650 characters per record maximum), you are still a long way from "information at the push of a button" on a good-sized business file—unless you want to run the report during lunch or overnight.

Much of the slowness can be attributed to the fact that *TIM* runs in Basic, and the Basic in the IBM PC is not particularly fast compared to some of its less noble competitors.

Innovative Software surely recognized the problem and helped somewhat by using a disk drive Speedup routine which is automatically invoked after you input the date during power up. It's quite an experience to watch the screen print A SPEEDUP and hear Drive A kick on the afterburner. (*Editor's Note: Innovative Software has promised that the version of TIM which will be available when you read this will be compiled and will be "20 to 30 times faster" than the version we reviewed.)*

It becomes difficult to separate the faults of TIM from the limitations of the IBM hardware.

It becomes difficult to separate the faults of *TIM* from the limitations of the IBM hardware, for which it is configured. Indeed, if the program were on a double-sided, double-density disk (with appropriate disk drives available) or, better yet, on a hard disk (a manual addendum offers instructions to eliminate the potentially hazardous SPEEDUP routine if you use a hard disk), part of the speed problem of getting to the various parts of the 346.6K total program would be eliminated. The other problem, on the IBM at least, is running the program in Microsoft Basic. A compiled version should help step up the program.

Recommendation

With my experience so far, I would not recommend *T.I.M. III* for the IBM PC for applications involving a continual, high volume of input/output through the data files. A word processing interface is promised to allow you to merge *TIM* data files with form letters and a global search and replace command will be available by the time you read this.

A small business user might also like to see *TIM* files shared with accounting or billing programs, too. But for small business or personal applications in which self-contained files need be updated only periodically, *TIM* offers a vast amount of data manipulation power. Almost too much power, as we have seen, for the likes of even a heavy-duty micro like the IBM PC. □

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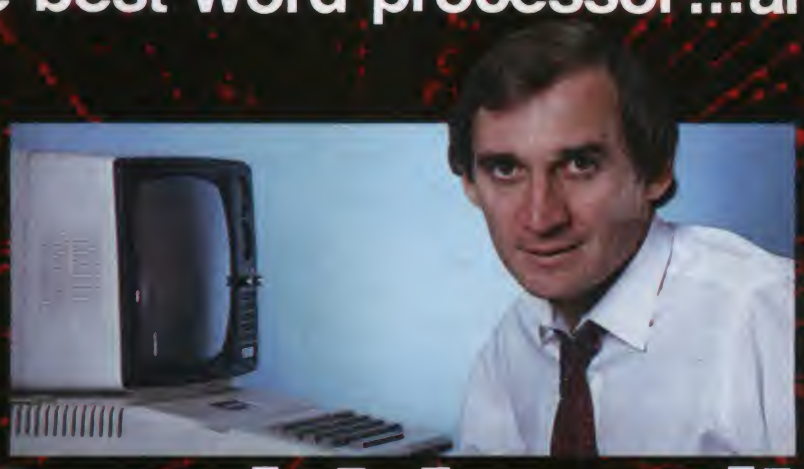

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creative computing software evaluation

A Manager For All Seasons

John Anderson

But Does It Do Windows?

You're just finishing an extensive demonstration of your Atari system for your dinner guests. The swirling, three-dimensional graphics display, comparable to those running on systems at five times the price, fades to black. As you boot some Bach on the music cartridge, you notice the thumbs of your guests are still stiffly akimbo, proof positive that the joysticks have once again done their job well. And then someone speaks:

"But what do you really *use* your computer for? What practical purposes does it serve?" Your guest smiles, leaning back in his chair as he sips your Chateau Neuf. His eyebrows arch menacingly, and silence fills the room.

For a frozen moment you are speechless—the timing of the question has caught you off balance. Here you were, displaying the capabilities of your Atari as state-of-the-art entertainment machine, running circles around the competition, and this nerd has the audacity to ask about practical applications!

Images race through your head—the hours you've spent learning Basic instead of watching TV; the way word processing has improved the quantity and quality of your written work; how your three-year old has already learned the alphabet. Then the thought strikes you, you return the smile. You calmly boot *Filemanager 800*.

Though several database management programs are available for the Atari, *Filemanager 800* is the only one to make extensive use of color, sound, and extended text modes to simplify program use. Through menu-oriented operation, it provides a clear and easy to understand command format. The screens are designed to make each function mnemonically unique and easy to access.

Before you can boot *Filemanager*, you must insert a small electronic key, called a "Data-Lock," into controller port number one. Without it, no information can be retrieved or altered by the program. More about this feature later.

Once the program is up and running, the main menu prompts for form creation or review, or a number of available maintenance functions. Form creation is integral to the performance of *Filemanager 800*, and you should think carefully about the most effective way to represent the information you wish to store. The manual is very complete concerning this, and is effective because it teaches through example. Let's look at a typical case.

The "Addressa" File

Everyone has use for an address book. By choosing number three on the main menu, "Create Form " you are prompted to input a filename. Let's call the file ADDRESS. You are then asked which disk drive the file will use. If your system is like mine, just hit return, and the program will default to drive one. Obviously if you have more than one drive, you can support multiple form access.

Next, the program prompts for field names and lengths. This is the most important facet of form creation. It takes a while to get used to the idea, but it's fundamental to all list processing, and is really quite simple. Let's call our fields FIRST NAME, SECOND NAME, ADDRESS, CITY/STATE, ZIP, and PHONE. Field length indicates how far you want the alphabetizing routine to "reach into" these fields during sorting. You then are prompted to input the "index" for the file—that is, the field name upon which you choose to sort and construct the file ADDRESS. The logical choice in this case is the field SECOND NAME.

And that's all there is to creating the file form ADDRESS. By pressing "select" from the main menu, you reach the record menu, and choose number one—"Enter record." You may then enter the names, addresses, and phone numbers of about 500 people, and still have some room on your data disk. *Filemanager* will automatically alphabetize the file to the index SECOND NAME.

You may specify up to nine pages of fields per record; *Filemanager* will automatically paginate files to the screen. Updating files is simple, as is deleting them, and a confirmation prompt keeps you from deleting something accidentally.

Once you have a datafile on disk, you are ready to do some data processing. Using the record menu, choose number 2, "Search." You will see your form

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SOFTWARE PROFILE

Name: Filemanager 800

Type: File management system

System: Atari 40K, Basic cartridge, at least one disk drive

Format: Disk

Language: Hybrid (Basic and machine)

Summary: Best of its kind currently available for the Atari

Price: $99.95

Manufacturer:
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displayed with blanks next to each field. Input someone's second name on the SECOND NAME field, push start, and that file will be retrieved. You may also search across four other fields simultaneously—for example, you could search for all the people with the first name Mary, zip code starting with a zero, and area code 201. The search function will display all relevant files, page-by-page.

Perhaps the power of this kind of progam is only now becoming apparent to you. Imagine a file called RECIPE, wherein, you could summon recipes through the fields CALORIES, COST, VEGETARIAN, SEASON, CUISINE, and the like. A file called ARTICLES might contain cross-referenced entries concerning all the magazine and newspaper articles you wish to have on file. You can search for all occurrences of your delimiters, all but the occurrence of your delimiters, all files up to or following them.

Filemanager can be used effectively even if your system does not include a printer, but you will miss out on the ability of the program to print out customized lists and mailing labels. These functions are invaluable to make *Filemanager 800* into a genuinely *practical* application of your Atari. I now keep several business and personal files on the system.

Updating or changing files is made simple, as most screen editor movements remain enabled from within the program. This means you can move the cursor to wherever you want it, input the change, and resave the file, without muss or fuss. Here again the capabilities of the Atari are fully exercised to simplify operation.

File M for Murder

One of the more horrific problems with many file management programs is their inflexibility. Using our example file ADDRESS, we might imagine reaching a point where a new field is called for—let's call it COMMENTS. With most database programs, the only way to add this field would involve rekeying the entire file. Not so with *Filemanager 800*: simply boot from the master disk another program called FILEMAINT. It will allow you not only to add fields to existing files, but to combine, rename, or delete entire files.

The program makes it pretty tough to kill data by mistake; in fact it makes it next to impossible. Don't, however, exit *Filemanager* simply by removing the disk and booting something else; rather access number seven from the main menu, "Save/end." If the index of a file has been altered in any way during a filing session, this function will save the altered index to disk. If the index has not been altered, the screen will merely redraw itself.

It's a good idea to get in the habit of "logging off" *Filemanager* in this manner every time, leaving the responsibility of executing this check to the program. If you fail to resave an altered file, you will not lose any data, but will have to reindex the file before you can access it again. In the case of a file of a hundred records or more, this will entail quite a wait. The manual is forthright in its documentation of this potential snag, but the user will still probably have to reindex a few files before the idea sinks in.

The "Data-Lock" key is another potential snag within *Filemanager*. At first I was enchanted with it; it seemed to be a very neat way to provide files with a modicum of security. As time wore on, this enchantment wore off.

First I misplaced the key, which I admit was my own silly fault, but might be a bit too easy to do. The key has no slot in it allowing it to be attached to a keychain, and so must be kept in a pocket, box, or desk compartment.

While the key was missing, the thought occurred to me that I might try dumping files to Basic. This was a very simple matter—no files you create with *Filemanager* are, therefore, really very secure.

These problems are trivial alongside the potentials of *Filemanager 800*. Its practical applications are limited only by the imagination of the user.

Meanwhile, Back at the Ranch-style Tract House

Expectation fills the air. After the program boots, you insert the datadisk containing the file WINELIST. You choose number two from the record menu, "Search," and conduct a search on the sub-field "FAVORITE OF," using as delimiter the name of the guest who asked you about the practical uses of our machine. Up pops the listing "Chateau-Neuf du Pape, 1974." Among other fields appearing with the file is the price, $17 a bottle. You then conduct a search using the same delimiter, but on the subfield "USUALLY BROUGHT BY." Up pops the listing for "Swillo," price: $2.99/gal. Somehow you find yourself appreciative of the fact that one of your guests has just spilled fine wine on himself. Laughter follows. □

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Versatile File Manager for TRS-80

Fredrik O. Haarbye

creative computing

SOFTWARE PROFILE

Name: Versafile

Type: Database management

System: TRS-80 Model I Disk

Format: Disk

Language: Basic

Summary: Inexpensive yet versatile file manager

Price: $29.95

Manufacturer:
Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102

Fredrik O. Haarbye, 5510 Broadmoor Plaza, Indianapolis, IN 46208.

If you are looking for something that will make your computer more useful, *Versafile* from Radio Shack may be the program for you. Enter this program and your computer is turned into an information system.

The program is written entirely in Disk Basic and loads in 5952 bytes (Version 2.2, Model I). At $29.95 it is one of the best buys around. It is very nicely packaged, and includes:

- An 18-page manual (in a hardcover three-ring binder; value $5.95).
- TRSDOS on the program diskette (value $14.95).
- *Versafile* Program ($29.95 - $20.90 = $9.05).

If you know of another program as useful as this for $9 let me know; I want to buy it.

What makes *Versafile* score high is its versatility—its name is very appropriate. Take a look at one example of a *Versafile* Index (Figure 1) and you will recognize some useful "personal" applications. And its usefulness in business is just as great.

The manual provided with the program suggests as examples a used car inventory, an insurance agent's client information file, and a foreign word dictionary. Figure 2 may give you some more ideas.

The program uses sentence-oriented storage and retrieval. File entries are stored under eight different keywords which may be used or changed at the user's option. Any word with seven or fewer characters can be used.

A file entry may or may not contain one of these keywords, and there may be more than one keyword in the sentence. The keyword may be placed anywhere in the file entry. Any character on the keyboard, except the arrows, may be used in the file entry, and 2 to 238 characters (spaces included) will be accepted per entry.

The tab key (right arrow) can be used to tab eight spaces. A period at the end of the file entry serves as delimitor.

Storage of a file entry is reasonably fast. For example after a 238-character entry has been typed in, the computer is ready for a new entry about seven seconds after the Enter key has been pressed. An

Figure 1.

```
** VERSAFILE **  VERSION 2.2 MOD                    TRSDOS
DISK#  15                                        (MIN.SYSTEM)
--- FILE TITLE ------------------------------------ DATA DISK -
 1. ADDRESS LIST                                  #  24
 2. TRAVEL RECORD & REFERENCES                    #  19
 3. INVENTORY - HOUSEHOLD ITEMS TOOLS             #  66
 4. MAINTENANCE RECORD - HOUSE, AUTO              #  33
 5. INDEX - BOOKS                                 #  22
 6. INDEX - SLIDES                                #  27
 7. REFERENCES - COMPUTER & DATA PROCESSING       #  38
 8. REFERENCES - PHOTOGRAPHY                      #  68
 9. REFERENCES - WOODWORKING                      #  44
10. REFERENCES - HIKING, MOUNTAIN CLIMBING        #  65
    ... END OF LIST
-------------------------------------------------------
>> LOAD DATA DISK & ENTER TITLE # OR HIT <ENTER> FOR INDEX
```

Figure 2.

```
--- FILE TITLE ------------------------------------ DATA DISK -
 1. APPOINTMENT CALENDAR 1980/1981                #  32
 2. CORRESPONDANCE INDEX 1980/1981                #  16
 3. RECORD - PERSONNEL                            #  17
 4. RECORD - CUSTOMERS                            #  34
 5. RECORD - PRODUCT COMPLAINTS                   #  39
 6. RECORD - VENDOR                               #  20
 7. RECORD - PRODUCTION/WEEK                      #  37
 8. RECORD - MAINTENANCE 1980/81                  #  25
 9. REFERENCES - OSHA REGULATIONS, DIRECTIVES     #  31
10. REFERENCES - MANAGEMENT TECHNIQUES            #  14
11. REFERENCES - PLANT OPERATIONS 1               #  12
12. REFERENCES - PLANT OPERATIONS 2               #  28
13. REFERENCES - CAD/CAM 1                        #  24
14. REFERENCES - GRAPHICS                         #  36
>> LOAD DATA DISK & ENTER TITLE # OR HIT <ENTER> FOR INDEX
```

Figure 3.

Figure 4.

improper entry will result in "I don't understand your entry. Please try again."

Searching

Searching the file is done by entering one or more words (or numbers) followed by "?". If a valid keyword is included in the search request, the file for that particular keyword is searched for a match. A "global search" can also be requested. In this case keywords can be omitted, and all keyword files will be searched.

This program packs a lot of capability into a small amount of memory space.

To shorten the search time, the program has 37 "unnecessary words" which can be changed at the user's option. Any of these words present in the search request will be removed from the request line prior to search, as will the keywords. The selection of all of these words (keywords and unnecessary words) is important and may affect the search time.

The computer will search for a minimum of five file items before outputting any information. Therefore, if there is only one match (anywhere) in the file, the whole file will be searched before an output is made. This is a bit of a nuisance but can be corrected with one of the program modifications listed at the end of this article.

A search through a 1000-item data file (average 50 characters per data item) may take about three minutes, while a search through 60 of these items may take 14 seconds. One nice feature of the search function is that it does not give up easily.

If a search request is made with a keyword and no match is found in that keyword file, the other files will also be searched. Output to the printer is optional.

Another (minor) nuisance: an empty line plus the request sentence is printed for every five file items listed. This can also be corrected with a program modification.

There is no facility to edit a file record directly, but this may not be a real handicap since records can be removed from the file with single or multiple kill commands. If the information supplied in the kill command is inadequate, a different file may be killed. However, the record that has actually been killed is listed for verification.

Another thing that makes this program outstanding is its documentation. Author William D. Schroeder should be complimented on this as well as the program quality. Twenty-two remark lines scattered throughout the program nicely explain the program statements.

In addition to an extra copy of the *Versafile* program, the disk contains all of the standard TRSDOS Library Commands and three utilities: FORMAT, BACKUP, and BASICR (re-numbering Basic). It is not likely that these routines (except possibly BACKUP) will be used when *Versafile* is running. The manual explains the use of FORMAT and BACKUP.

To sum it up, this program packs a lot of capability into a small amount of memory space. Although it has no alphabetic or numeric sort ability, this may be an advantage since there are no complicated instructions needed to use it. The program has performed reliably for me during six months of extensive use.

Program Modifications

I have made the following seven modifications to *Versafile*. They provide more disk space, customize the program, and make it easier to use.

1. Kill all unnecessary files on the disk to provide an additional 16 granules of disk space. It is not likely that any of the following files supplied with the program will be used when running *Versafile*. If there is a need, slip in an un-modified disk.

In the DOS READY mode enter:

KILL FORMAT/CMD.FORMAT	(3 grans)
KILL BACKUP/CMD.BACKUP	(3 grans)
KILL BASICR/MCD.BASIC	(5 grans)
(Do not kill BASIC/CMD)	
KILL VERSA/BU	(5 grans)

2. Removing all remark lines adds about 1200 bytes of RAM space and one granule of disk space.

Delete the remark parts of lines 70 and 125, and lines 299, 369, 999, 1199, 1369, 1399, 1497, 1609, 1654, 1669, 1699, 1999, 2099, 2999, 3089, 3999, 4999, 5999, 9999, and 18999.

If you have a utility which will remove spaces in the program lines (such as NEWDOS/80 Ver. 2.0), you can gain another 400 bytes.

3. This modification replaces the "Title Page" with one that has information pertinent to the file created by the program. In addition to the title of this file, it also shows the keywords in use for the file. (See Figure 3.)

Delete all lines to and including line 70 and add the lines 10 through 90 and 23000 and 23010 in Listing 1.

4. It is useful to be able to show the keywords any time the program is run-

Listing 1.

```
10 CLEAR100
15 TITLE$="*  COMPUTER & DATA PROCESSING ARTICLES  *
20 S1$="PERIOD: JANUARY 1980 - NOVEMBER 1981
25 S2$="DATA DISK #0038
30 CLS:PRINT@151,"**  VERSAFILE  **
35 PRINTTAB((64-LEN(TI$))/2)TI$
40 PRINT:PRINTTAB((64-LEN(S1$))/2)S1$
45 PRINTTAB((64-LEN(S2$))/2)S2$
50 PRINT@70,STRING$(51,131);:FORY=4TO23:SET(113,Y):NEXT
55 PRINT@518,STRING$(51,131);:FORY=5TO24:SET(12,28-Y):NEXT
60 PRINT@576,;:GOSUB23000
65 PRINTTAB(3)"* WHEN PROMPTED WITH ??>> , INPUT FILE REQUEST OR DATA. *
70 PRINTTAB(17)"* FOR HELP, PRESS <ENTER> *
75 PRINTTAB(8)"ENTER DRIVE # USED FOR FILE DISK (0 - 3) ";:PRINTCHR$(95);
80 D$=INKEY$:IFD$=""THEN80
85 IFD$("0"ORD$)"3"THEND$="":GOTO80
90 CLS:PRINT"DATA DISK IS IN DRIVE #"D$:POKE16410,ASC(D$)
110 CLEAR 12000
120 DEFSTR A,B,C,D,E,F,K : DEFINT L,X,Y,Z:DIME(160),Y(160),A(25),K(25)
125 POKE27000,5:DS=":"+CHR$(PEEK(16410))
300 B="":Z=1:PRINT"??>> ";:LINEINPUT B:A=" "+B
315 IFB>"0"ANDB<"9.5"THENPOKE27000,ASC(B)-48:MP=1
320 IFB=";"THENCLS:GOSUB23000:MP=1:GOTO335
325 IFB=""GOTO24000
330 IFMP=1THENPRINTCHR$(27)CHR$(27);:PRINTCHR$(255):FORX=1TO25:NEXT:PRINTCHR$(27)"TAB(4)"NEW";
335 IFMP=1THENPRINTTAB(8)"SEARCH REQUEST WILL OUTPUT ITEMS <#)"PEEK(27000)"AT A TIME <#)":MP=0:GOTO300
1405 Q=PEEK(27000):IFK(2)=""ANDZ>QTHENRET=1:Z=Q:GOSUB1650:RET=0:Z=1:E(Z)=" "
1654 IFP=1ANDZ>5THENTV=Z
1655 IF P=1 THEN TP=TV-Z:FOR L=1TOZ:IFY(L)=Y1THEN TP=TP+1:LPRINTUSING"### ";TP;:LPRINT E(L):NEXT: ELSE NEXT
1656 IF RET=1 AND P=0 THEN PRINTTAB(60)"-"ELSE IF RET=1 THEN RETURN
1659 IFB$="9"THENPRINTCHR$(27)TAB(40)"- SEARCH TERMINATED -":PRINT:RUN110ELSEIFRET=1THENRETURN
1660 PRINTSTRING$(63,45):IFP=1THENLPRINTSTRING$(79,45):RUN110ELSERUN110
4000 IF INSTR(MID$(E(L),2,59)," ")=0THENTV=TV+1:PRINTUSING"### ";TV;:PRINTMID$(E(L),2,LEN(E(L))-2);:
     IFLEN(E(L))=62THENRETURNELSEPRINT:RETURN  ELSE LT=LEN(E(L))+1:LS=1:LE=60:
     IF LT<250 THEN E(L)=LEFT$(E(L),LEN(E(L))-1)+".":LT=LT+4:TV=TV+1:PRINTUSING"### ";TV;
4010 IFLE=LSTHENPRINTTAB(4)RIGHT$(E(L),LT-LS):RETURNELSEIFMID$(E(L),LE,1)>" "THENLE=LE-1:GOTO 4010
4011 PRINTTAB(4)MID$(E(L),LS+1,LE-LS-1):LS=LE:LE=LS+60:IFLS>LT THEN  RETURN ELSE IF LE=>LT
     THEN EL=MID$(E(L),LS+1,LT-LS):IFEL=""THENRETURNELSEPRINTTAB(4)EL:RETURN:ELSEGOTO4010
10000 DATA " APLCTON "," UTILITY "," TUTOR "," REVIEW "," BUSINES "," GRAPHIC "," GAME "," HARDW "
23000 PRINT"KEYWORDS IN USE ARE:
23010 RESTORE:FORX=1TO4:READKY$,KY$:PRINTKY$,KY$,:NEXT:RESTORE:PRINT:RETURN
24000 CLS:PRINT"FILE DATA -"TAB(40)"PROGRAM COMMANDS:
24010 PRINTTAB(5)"END STATEMENT TO BE FILED WITH A PERIOD ..."TAB(60)".
24020 PRINT"SEARCH FILE -":PRINTTAB(5)"END QUERY REQUEST WITH QUESTION MARK ..."TAB(60)"?
24030 PRINTTAB(5)"LIST AN ENTIRE KEYWORD FILE ..."TAB(52)"KEYWORD ?
24040 PRINTTAB(5)"INTERRUPT THE SEARCH, HIT @ ..."TAB(60)"@
24050 PRINTTAB(5)"GLOBAL SEARCH, ENTER (NOTE SPACE REQUIRED) ..."TAB(59)"*"CHR$(95)
24060 PRINTTAB(5)"PRINTER OUTPUT: BEGIN REQUEST WITH P + SPACE ..."TAB(59)"P"CHR$(95)
24070 PRINT"KILL FILE -":PRINTTAB(5)"SINGLE KILL: BEGIN STATEMENT WITH K + SPACE ..."TAB(59)"K"CHR$(95)
24080 PRINTTAB(5)"MULTIPLE KILL: BEGIN STATEMENT WITH MK + SPACE ..."TAB(58)"MK"CHR$(95)
24090 PRINT"OTHER COMMANDS -":PRINTTAB(5)"DISPLAY KEYWORDS IN USE: ENTER ; ..."TAB(60)";
24100 PRINTTAB(5)"DISPLAY PROGRAM COMMANDS ..."TAB(50)"PRESS <ENTER>":MP=1:PRINTCHR$(27):GOTO335
```

ning. Adding line 320 of Listing 1 and lines 23000 and 23010 of modification 3 will do it.

Also, having to hunt through the manual to find an explanation of program commands is a bit of a chore. To bring all of the commands to the screen any time, change line 300 and add lines 325, 335 and 24000-24100 of Listing 1. (See Figure 4.)

5. Sometimes it may be desirable to change the search to fewer or more than five items before an output is made on the CRT. In response to the ??>> prompt, when a number 1-9 is entered, this becomes the number of items searched before an output is made. Change lines 125 and 1405, add lines 315, 330 and 335 as shown in Listing 1.

6. When several references are listed at one time, it is handy to have them numbered. The redundant printing of an empty line and the request sentence when listing to a printer can also be changed. Add line 1654 and change lines 1655, 4000 and 4010 as in Listing 1.

7. Some odds and ends: When several listings are made for one file request, line 1656 wastes space and makes the output a bit confusing. The same is true for line 1660. I would also suggest changing lines 110 and 120 as in Listing 1. □

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Bridging The G.A.A.P.

Ron Exner

#'$&(#(#)'$%##$%!!!!#%#% is a common expression that is frequently muttered under the breath of almost anyone who has to deal with "doing the books" of a small business. In fact, rumor has it that the Accounting Standards Board is going to incorporate such expressions into the almost sacred Generally Accepted Accounting Principles. If you have ever operated a manual accounting system you know exactly what I'm talking about.

The prime source of frustration and error is the Accounting Cycle: that recurring circle of events that makes everything else happen. Briefly, it is composed of seven parts: 1) entering transactions in an appropriate journal, 2) posting journal entries to the general ledger, 3) making up a work sheet, 4) producing financial statements from the work sheet, 5) journalizing closing entries, 6) posting closing entries to the General Ledger and balancing each account, and 7) making a post closing trial balance.

Needless to say this procedure, which in fact is even more complicated, is almost impossible to complete without numerous time-consuming and frustrating human errors and their numerous verbal counterparts.

Well, Bunkie, take heart, relief is on the way. Between the liberalization of investment tax credits and the new A.C.R.S. depreciation system on the one hand and the increasing number, sophistication and user friendliness of accounting packages for computers on the other, you would be a #&$'$&#'&#' fool not to let a machine take over the drudgery and frustration of dealing with the accounting cycle and Generally Accepted Accounting Principles.

Converting to a computerized accounting system is more tedious and boring than setting up a manual system.

One of the most popular packages on the market today is produced by B.P.I. It is not perfect but it is exceptional.

Two terms central to the design and use of this General Ledger package are "journal-based" and "automated." Here is a system that is truly a journal-based double entry accounting system that performs with single entry simplicity while conforming to Generally Accepted Accounting Principles.

The G/L module is more than a General Ledger to which Accounts Receivable and Accounts Payable additions can be appended. For one thing, it breaks the seven-step accounting cycle down to: 1) input 2) post/reports and 3) closing. This is accomplished primarily by eliminating many of the repetitious, tedious and error-prone human entries through automation. For another, it is a General Ledger which has A/R and A/P subsidiary ledgers along with a Payroll Register attached. Although these subsidiary systems have limited features, they can be very useful in some business situations.

Structure

The General Ledger system comes on four disks: data input; posting/reports; maintenance; and sample data. The user uses the input and posting/reports disks primarily, and only occasionally refers to the maintenance disk when creating,

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editing or listing accounts or schedules. The sample data disk is used in conjunction with the documentation as tutorial data.

All of the system disks are copy protected and not only is no backup provided, but no mention is made as to how to go about getting one or what the cost might be. Watch that coffee cup!

Despite this and other shortcomings, B.P.I. is basically a well conceived and well designed user oriented system that has incorporated several surprising and automated features. One is the inclusion of "skeleton" Accounts Receivable and Accounts Payable along with a "skeleton" payroll register.

Each journal is well thought out and has a simple, but effective, operation.

These sub-modules act exactly as their manual counterparts except that most of the information generated from or entered into them is automatic and 100% reliable — except for human error.

Setup

Converting to a computerized accounting system is more tedious and boring than setting up a manual system. With the B.P.I. General Ledger system this is unnecessarily, painfully apparent. Setup of the General Ledger requires two separate operations and excessive, unnecessary repetition. In the first step you input the account number and then the account name. This is done for all the accounts. Then, starting over again, the General Journal is entered and each account number, that was just entered in step one, is entered again but this time the opening balance is input.

Another weakness is the fact that the account numbering system is only four digits, effectively three. That is, the last digit is used to total Balance Sheet accounts to a control account or to designate Income Statement accounts as departmental or company. Setting up the skeleton ledgers, vendors and employees is similarly effective but inefficient. Fortunately, this process need be done only once for each company.

Documentation

The General Ledger system comes wrapped in a very impressive, padded standard sized three ring binder. However, upon opening the binder one finds 108 pages of unindexed, paper back bound, combined tutorial and reference material. Of this 108 pages, 37 are sample reports, 3 are concerned with error checking and 8 are a glossary of accounting and B.P.I. terminology. The remaining 55% is in the form of a mixture of tutorial and reference manual.

Although the tutorial performs well in its role of familiarizing the user with the intricacies of the system, since it is intermixed with reference information it makes the use of the reference material unnecessarily difficult. Part of the reason for structuring the material this way may stem from the fact that the authors make one important assumption about the user: he is familiar with Generally Accepted Accounting Principles and has a working knowledge of accounting basics.

This seems to be a reasonable approach since the objective of the system is to perform accounting tasks and not teach accounting principles. However, considering the effort that apparently went into designing the working part of the system it is disappointing to find documentation that is comparatively so unimaginative.

Input

The real strength of the system can easily be seen when booting the data input disk. The menu is displayed as in Figure 1.

Each journal is well thought out and has a simple, but effective, operation. The journals and their functions are as follows:

Cash Disbursements: Acts as a check register. May distribute a check charge to as many as twelve different accounts. Can be preprogrammed with vendors, employees and regular payees and their normal charge distribution. There is no provision for printing checks.

Invoice Register: This is the Sales Journal. However, it not only records merchandise sold on account but may include cash sales as well. May be preprogrammed for as many as ten different departments, branches or other divisions.

Cash Receipts: Used in conjunction with the Invoice Register. Makes a chronological record of customer payments and automatically credits the A/R control and subsidiary accounts.

Merchandise Purchases: Used when a formal A/P system is needed. Each vendor is given a number and when purchases are made, the charge may be distributed to up to ten different cost of sales accounts.

Cash Sales Journal: Designed for use with a cash register. Entries are made directly off the register tape into accounts determined during setup and company configuration.

General Journal: Acts as the traditional G.J. Requires both credit and debit entries but remembers what the current G.J. entry number should be.

Incorporating a high degree of automation into these special journals eliminates having to make over half the required offsetting entries to the subsidiary and general ledgers.

There are times when flexibility is notably absent.

For example, if your cash account is no. 1045 then when setting up the Cash Disbursements Journal you simply indicate 1045 as the account to be credited when checks are written. So, when using the C.D. Journal, you simply enter the date, payee, amount of the check and its distribution (the system knows what the current check number should be). The total charge is shown at the bottom of the screen and is, when posted, automatically credited to 1045 (cash). There is no possibility of making an erroneous entry to 1145, for example.

This automation of special journals not only means that each subsidiary account will balance to its control and that the total amounts entered from the keyboard and by the computer will balance but that the user can forget about Generally Accepted Accounting Principles and just enter the data as if he were using a manual system.

The built in structure and automation of the system keeps the user from making gross mistakes such as forgetting to post to a subsidiary account or skipping a check in the C.D. Journal. The same holds true for the other journals.

Reports

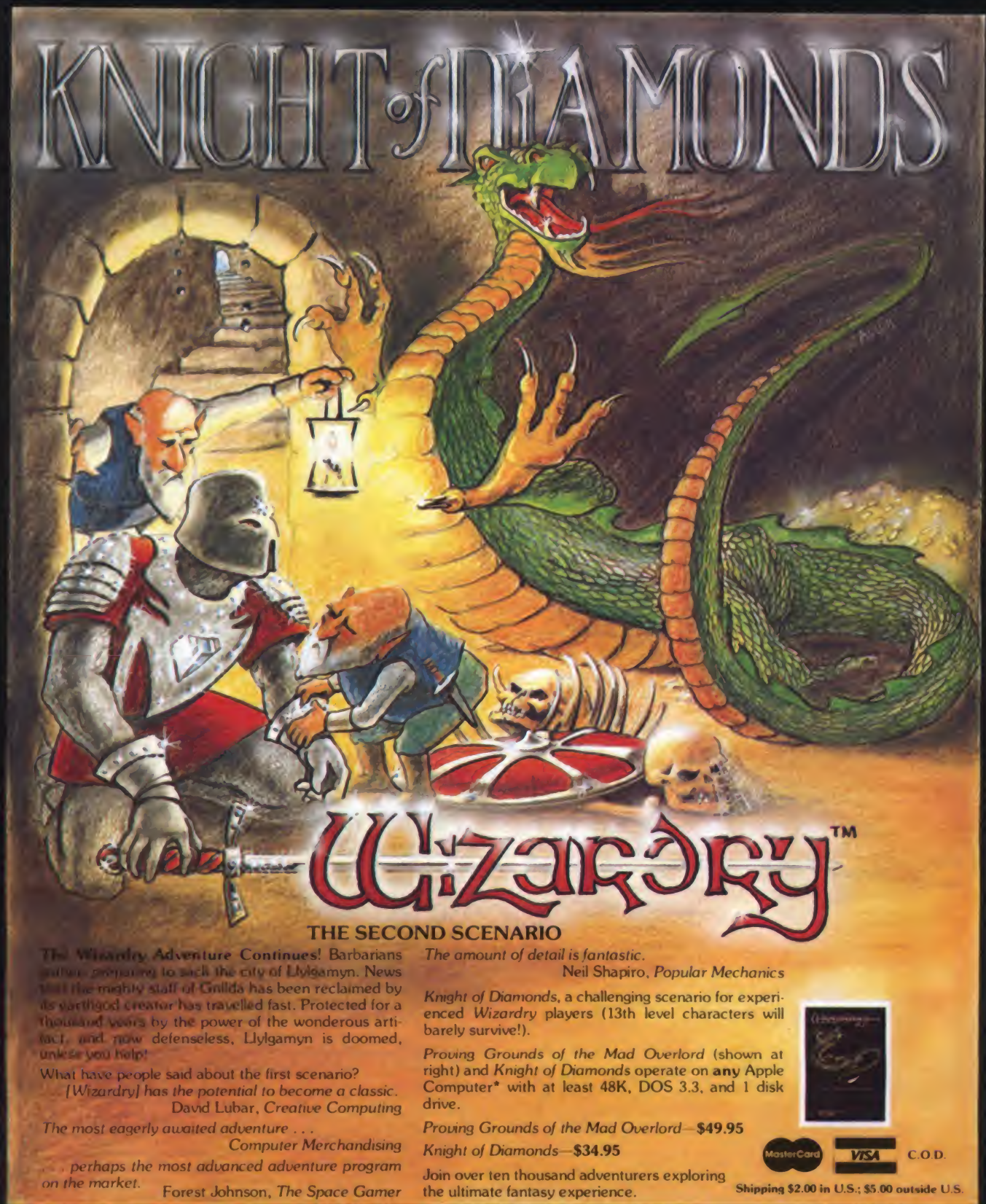
Once the information is input via the proper journals the next step is to run "post/reports" disk. The options are listed in Figure 2.

Figure 1.

Enter Cash Disbursements	List Cash Disbursements
Enter Invoice Register	List Invoice Register
Enter Cash Receipts	List Cash Receipts
Enter Merchandise Purch	List Merchandise Purch
Enter Cash Sales	List Cash Sales
Enter General Journal	List General Journal

Figure 2.

Post	Income Statement
Trial Balance	Balance Sheet
End of Month	End of Quarter
End of 4th Quarter	End of Fiscal Year



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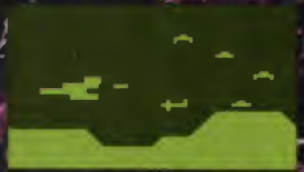

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As in the data disk, the user is given the option to enter a "queue" a series of operations to be run. For example, Post, Income Statement, Balance Sheet, and Trial Balance could all be entered into the "queue." By simply indicating the "run queue" option, each of these entries would be executed, one after the other, automatically.

Of the options on this disk, posting is the most highly automated. When posting, each journalized entry is recorded in the General Ledger along with an audit trial that even a non-accountant can easily follow. When posting is complete, a hard copy of the General Ledger and skeleton subsidiary ledgers are printed.

Of course, no system can be all things to all people. There is a trade-off for built-in structure and automation. Although the system is very flexible in its adaptability to almost any business configuration there are times when flexibility is notably absent. This is most evident when producing financial reports.

On the Income Statement there is, for example, no provision for budgeted or current vs. previous period. What is available is a B.P.I. preprogrammed, format of "current," "current-%-of-sales," "year-to-date" and "year-to-date-%-of-sales."

The Balance Sheet is much like the Income Statement in that it is fixed in its format but shows only the information for the current period. In general, I found the reports and report formats for the Balance Sheet and Income Statement somewhat limited but quite adequate.

Summary

From an accounting standpoint, the B.P.I. General Ledger system is very strong. However, there are several notable weaknesses in what is otherwise a very smooth running, efficient user-oriented package. For one thing, given the lack of reset protection in software, this package is obviously designed for newer Apples.

Secondly, the system fails to store the printer configuration to disk. This means that each time the printer is turned on and a report generated, a tedious, and annoying series of questions must be answered.

Third, in such a highly automated system it is surprising to find that there is no provision for repetitive entries such as depreciation, rent, etc.

Lastly, the setup procedure is tedious and frustratingly repetitive. Despite these detractions, the inherent strength of the design of the B.P.I. General Ledger package — as it invisibly conforms to Generally Accepted Accounting Principles, as it is reflected in the use of specialized journals, and as automation ties G.A.A.P. and the special journals together — can not be denied. It is on the basis of these strengths that the system should be considered. □

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SOFTWARE ARTS TECHNICAL NOTES, BY THE CREATORS OF VISICALC

SATN

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IN THIS ISSUE:

Introducing SATN
A Close Look at @LOOKUP
Matching with @LOOKUP
Using @LOOKUP To Calculate Withholding Tax
Exchanging Data Using The DIF Format
Rabbits And 3" x 5" Cards
Plus VisiCalc Pointers

INTRODUCING SATN

A CLOSE LOOK AT @LOOKUP

Keeping VisiCalc Smooth and Silky

Will Fastie

It should certainly be no surprise to anyone, least of all a regular reader of this or other computer magazines, to learn that VisiCalc is the Number 1 software package ever. Estimates of the number of copies sold vary, but by now 250,000 is not an unreasonable estimate.

Dan Fylstra, of VisiCorp (nee Personal Software), was quoted as saying that there was probably one unauthorized (translated: pirated) copy for every sold copy, and maybe more. Then, of course, there are the spinoffs—SuperCalc, SuperComp, Microplan, Multiplan, and others, including versions for all the major minicomputer timesharing systems. And how many people use each copy? The total number of users is surely in the millions.

That's a lot of people using spreadsheet programs. For that kind of user population, it seems natural to expect that much would be written about how to use the programs. What techniques are possible, and how are they used? For large models, can efficiencies be gained? How do the advanced features work, and what are they good for? And just what can be done with the programs? Are they generally applicable, or are they good only for accounting and financial applications?

Well, it turns out that very little has been written. There are a few books and a few newsletters, but for the most part, there is nothing to help one learn how, nothing to make one think, nothing to stretch one's imagination.

Until now, that is. About a year ago, Software Arts, Inc., the company that created VisiCalc, inaugurated *SATN*. It's pronounced "satin," and it stands for "Software Arts Technical Notes." It's a bi-monthly publication chock full of all those things: pointers on how to use VisiCalc, articles on technique, detailed examples, and best of all, mind benders. It is the mind benders that make this such a creative and valuable publication, one really worth having.

What is a mind bender? Perhaps the best example is one of the articles from the second issue, November/December 1981. This article explained how to set up a worksheet to solve cryptarithms, and used as an example the famous SEND + MORE = MONEY problem. (For ye of little puzzle knowledge, a cryptarithm is a puzzle in which each letter represents a number. The object is to deduce the digits such that the formula will be correct.)

Each article is written with painstaking care, to be sure each step is clear and correct.

Why is this a mind bender? Well, would you have thought of using VisiCalc as an aid to solving this problem? Seeing this from a program which seems to be suited for little more than ledger sheets is startling, unexpected. And challenging.

This is not to say that traditional accounting and financial applications have been overlooked in favor of more esoteric ones. The March/April 1982 issue had articles on Individual Retirement Accounts (IRA), income tax, and internal rates of return. The premiere issue discussed calculation of withholding tax.

Unexpected topics included the construction of a project scheduling form, manipulation of dates arithmetically, forecasting models for predicting election outcomes, and, of course, SEND MORE MONEY.

There are no credits in *SATN*, not even a masthead. The publishers are Bob Frankston and Dan Bricklin, inventors of VisiCalc and founders of Software Arts. Dena Feldstein, who is the documentation manager for Software Arts, is the managing editor. The rest of the staff works full time on *SATN*. Jack McGrath is the editor, Debbie Ruppert is the copy editor, Joyce Hurd is the circulation manager, and Lisa Underkoffler is the marketing manager.

So far, Software Arts has provided all the material for *SATN*. In an interview with *Creative*, a tired-sounding but still energetic Jack McGrath described how time-consuming each article is. Once an idea has surfaced, it is carefully constructed in VisiCalc.

This process is particularly tedious, as the resultant model must work in all (or almost all) the versions of VisiCalc. That means a more recent enhancement might have to be ignored in favor of an imple-

W. H. Fastie, 7110 Sheffield Road, Baltimore, MD 21212.

mentation which is more standard. Then the article is written with painstaking care, to be sure each step is clear and correct. In answer to the question "Is *SATN* considering becoming a monthly publication?" Jack only groaned.

Jack did mention that an external submission plan had been put into effect. This is good news, because it will mean a larger pool of ideas to tap. A writer's guide is now available that describes what *SATN* is looking for and how the article should be constructed.

SATN will pay for articles accepted for publication. Jack suggests that interested authors submit a very brief "query" which describes the concept. The idea behind the query is to save everybody time and work by dealing first with a very brief description which can be quickly checked against previously published material and which can be considered without need of examining a complex model. Actually, this is a good idea because it forces the author to present the concept in a simple, lucid form.

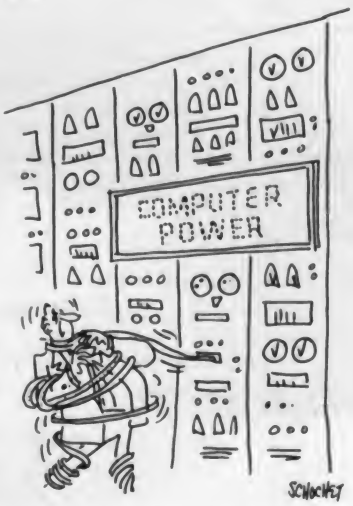
If that can't be done, the idea probably isn't so great. If an agreement is reached, *SATN* wants a sample of the model on disk, to verify its operation and to avoid spending the time required to enter it.

SATN will pay for accepted articles upon publication, and this is the only fault I can find. If the idea is good, and *SATN* wants it, payment should be made upon acceptance. This is also a better method of inducing people to advance a query.

In short, *SATN* is a very professional, high quality publication. Although the price of $30 for six bi-monthly issues may seem high, the ideas presented can be stimulating enough to save far more than that in time.

For articles or queries, write: *SATN*, Editorial Department, P.O. Box 494, Cambridge, MA 02139.

For subscriptions, write: *SATN* Subscriptions, P. O. Box 815, Quincy, MA 02169. □



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SOFTWARE PROFILE

Name: Monkey Wrench

Type: Basic Utilities Package

System: Atari 800 8K

Format: ROM "Firmware"

Language: Machine

Summary: Provides several helpful additions to Atari Basic

Price: $49.95

Manufacturer:
Eastern House Software
3239 Linda Dr.
Winston-Salem, NC 27106

John Anderson

Basic programmers, whether professionals or struggling novices, stand to benefit from any help they can get. Atari Basic is a relatively friendly language in which to work, thanks to extensive syntax checking and a versatile editor. It is an excellent system for learning—yet it has some drawbacks.

Monkey Wrench attempts to correct some of these, and does a very good job of it. It provides nine new Basic commands, as well as a machine language monitor with 15 commands. It also bears the real distinction of being the first (and currently only) ROM board for the right hand slot of the Atari 800.

Installation

I cannot in good conscience call *Monkey Wrench* a ROM cartridge, as it has no case to speak of. The only disadvantage of this is the possibility of installing it backwards in the computer—a potentially devastating disadvantage. Atari cartridges will not install any way but correctly. Further, the board must be installed with the chips facing *away* from the keyboard—perhaps counterintuitive to the notions of many users. Needless to say, care should be taken on this point.

My machine has been around for nearly two years without ever having anything stuck in the right-hand slot. Hence, when I first plugged in *Monkey Wrench*, I got some rather glitchy results, ranging from a blank yellow screen (you may be familiar with that one, it's an operating system bug), to some spectacular electronic "rain" blowing across the screen.

The manual suggests cleaning the contacts with alcohol. I used a little contact cleaning spray and plugged the board in and out several times. When I looked at the board contacts, they were filthy. I cleaned them with a pencil eraser, plugged the board back in, and got the title display. I then experimented for over an hour without any problems. It is also mentioned in the manual that the 850 interface must be *off* before booting Basic with *Monkey Wrench*.

Operation

Monkey Wrench is "transparent"; that is to say, after the title display indicates that it is functioning, it will not evidence itself again until called. The sole exception to this surfaces when the user tries to move the cursor with "control arrow" keys. The cursor movement arrows are now accessed without the need to press control, while the plus, minus, equal, and asterisk keys are accessed by pressing control.

This option takes a bit of getting used to, but is a much more convenient keyboard configuration for Basic editing. Nine times out of ten, you'll want to use those keys for cursor movement. If this function is for some reason undesirable, you can toggle it off with a simple ">E" command, reverting to normal keyboard operation.

It's Got Your Number

Ready for an editing session in Basic? Well get set for it, because you won't have to worry much about numbering, renumbering, or deleting blocks of line numbers any more. Automatic line numbering is easy; simply enter ">a", followed by your choice of starting line number and the increment value you

want. When you press return, those line numbers will be displayed automatically.

This may seem to some to be a minor convenience. All I can say is once you get used to it, you'll never want to be without it.

The same goes for block deletion, accessed by ">d" followed by the first and last line numbers in the range to be deleted. Certainly you could sit and patiently delete each line of the block. In a substantial modification, however, this would become tedious very quickly, and the real benefit of this feature would be seen.

Most powerful and beneficial of the numbering commands is renumber, ">R" followed by the starting line value and the increment value you select. *Monkey Wrench* will renumber your Basic program in whatever configuration you wish, changing not only line numbers but all references to line numbers occurring within the program.

I experimented with renumbering three of my own Basic programs (of some complexity), and it works perfectly each time. It should be noted however, that I do not use "names" to call subroutines, a friendly and helpful capacity of Atari Basic, i.e., "GOSUB MAINLOOP." As *Monkey Wrench* is unable to distinguish between "name" constants and any others in a program, this will cause problems in renumbering. This is true of any renumbering routine, and may be reason enough to steer away from "naming," at least when confronted with a choice between quick and painless renumbering and named subroutines.

Because the renumber command uses screen memory as a buffer, there is a limit to the length of a program that can be renumbered. By changing the graphics mode, the total length can be brought to about 1000 lines of code—probably more than you'll need for any single program file.

Some More Than Marginal Additions

By pressing ">M", screen margins can be reconfigured without the need for cryptic POKEs. Since the Atari screen defaults to 38 characters, many programmers (especially those with video monitors) will want to move the margins out to a full 40 characters.

For those who wish to commune with the Atari CPU, the command ">#" will convert decimal values to hexadecimal, while ">$" will convert hex values to decimal. For beginning machine language programmers (of which category I am a lifetime member) these utilities are indispensable.

Typing ">T" followed by hex values will perform a memory test. Don't be shocked if you discover some bad bits of RAM in your Atari. I did, in two machines. The only disadvantage to this function is that testing is very lengthy, and looks just like a system lock-up unless bad bits are turning up.

Most powerful and beneficial of the numbering commands is renumber.

Monitor Does Not Support Disk

In addition to these commands, a small machine language monitor is provided. Memory location contents can be displayed between any two addresses, and be toggled to display the ATASCII equivalents of these contents, as well as disassembled. The 6502 register contents can be displayed, memory and registers altered, and searches conducted within code for ASCII strings or hex characters.

Memory can be saved and loaded, but very unfortunately, only to cassette. Thus, this monitor will be of only limited utility to all but the most single minded hackers. The monitor is handy for developing short machine language subroutines within Basic programs, and while it will run without Basic, it will probably not be of much use in this mode.

The utilities offered by *Monkey Wrench* are easier to use than disk-based utility programs. They never have to be loaded, and are not co-resident with the program you are working on, at least as far as the screen editor is concerned. All commands are available at the touch of a button or two, and with the exception of the RAM test, are uniformly quick to execute. This "transparent" quality will be most appreciated by the intermediate programmer, at whom the package is best aimed.

You will note that I hedged a bit about what *Monkey Wrench* does in and to RAM. The fact is that it does eat up some memory, including part of page six, which could cause some rare problems. Remember also that each cartridge eats up 8K when plugged in: Basic and *Monkey Wrench* will bring free memory on a 48K machine down to about 30K. □

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SOFTWARE PROFILE

Name: Starship Commander

Type: Space ship simulation

System: 48K Apple II

Format: Disk

Language: Applesoft and machine

Summary: Good for patient space fans.

Price: $39.95

Manufacturer:
Voyager Software
P.O. Box 15-518
San Francisco, CA 94115

Starship Commander is a space ship simulation game played on a 48K Apple II. You are the commander of the large Starship USS Ranger and have the task of destroying up to three enemy Vegan vessels.

Each turn is composed of visiting any or all of the seven starship stations: Life Support, Navigation, Weapons, Science, Communications, Defense and Engineering. Decisions can be made at each station and information can be obtained. Each turn ends with a three-dimensional display of the starship firing at the Vegans and the Vegans firing back.

The game ends when you have destroyed all the Vegans or when they have destroyed you. Or the game can end with you surrendering or you talking the Vegans into surrender (done at the Communications Station). A real chicken way for the game to end is for you to hotfoot it out of the galaxy and get out of range (6500 megameters) of the Vegans. Only a party pooper would use the end-of-game option.

After each turn you have the option of saving the game, so you can stretch a game out over several days or weeks.

The Life Support Station controls crew assignments, team assignments and life support power allocations. You, as commander, must rotate your teams as they fatigue. Also, you can reassign personnel as they get wounded—or worse.

The graphics in this part of the game are fantastic. The relative efficiency of the three teams (Duty, Standby, and Sleep) is shown by a bar chart in which each "bar" is an outline of a person.

In the Navigation Station you can control all movements of the ship: speed, direction and evasive action. The Weapons Station, which you should visit every turn, controls all firing of the weapons system (positrons and torpedoes). The Science Station displays the enemy's status.

You can communicate with the Vegans in the Communications Station. Here you can ask for their surrender and will receive it only if the Vegans have but one badly damaged ship remaining. You can surrender or try to bluff the Vegans into running away.

The Defense Station maintains all shields. It is important to give the correct power to those shields facing the Vegans. If one of your shields is damaged you can have it fixed by allocating repair 'droids to the affected shield. Repair management as well as power redistribution is done from the Engineering Station.

Like most simulation games, *Starship Commander* is slow. It takes about 15 seconds to move from one station to the next. It is designed as a one person game—you vs. the computer (Vegans). Thus, it may appeal only to shut-ins or hopeless Trekkies.

Simulation games frequently have the redeeming grace of being educational. However, with *Starship Commander* you become good only at starship management and wanton destruction. It seems that a better game might try to simulate a real life situation, the well known Starship Enterprise, or a situation with a more socially acceptable goal.

Starship Commander has one very interesting feature: the only input communication is via the game paddle. The entire game could be (in fact is) played without the use or benefit of the keyboard. The author has employed ingenious methods of communicating decisions, speeds, personnel selection, etc., with only a dial and a button. It took an enormous amount of human engineering to do this, but it can be a bit tedious.

Starship Commander is a good game for people who prefer long, detailed adventures in space to the fast pace of an alien invasion. □

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SOFTWARE PROFILE

Name: Lemmings

Type: Game

System: 48K Apple II or II+, disk drives, Atari-type joystick recommended.

Format: Disk

Language: Assembly language

Summary: Maddening fun

Price: $29.95

Manufacturer:

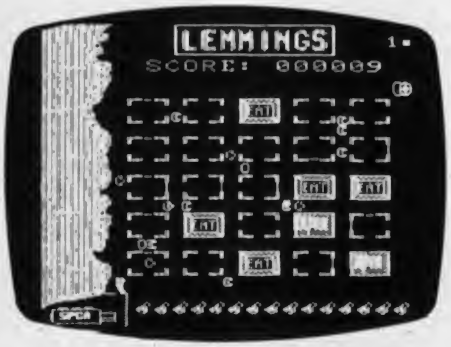
Sirius Software
10364 Rockingham Dr.
Sacramento, CA 95827

Sirius Software has released a game called *Lemmings*. Everyone knows what lemmings do: they periodically hurl themselves into the sea. How do you make a game out of that? Sound a bit grisly? It isn't.

To understand the point of the game, we must understand why they march to the sea. We can explain in one word: overpopulation. Sound more interesting? Let's see.

Lemmings casts you in the role of an SPCA employee whose job is to control the lemming population in your town. Your town is laid out in a tidy grid, and is composed almost entirely of vacant buildings. Male and female lemmings climb out of a manhole on the edge of town at random intervals.

To control the population, you must incarcerate "pairs of non-breeding lemmings" in the empty buildings. Lemmings come in five flavors: male, female, neutered, baby and senile. When a male and a female meet, they breed, and the result is, of course, a baby lemming which soon develops a gender of its own. Neutering occurs at the SPCA to which the rodents are taken by the SPCA truck.



Each building has four doors, all of which must be closed before you can claim 50 points for locking up a pair. A door closes each time you exit a building. You can deposit a lemming in a building before all doors are locked, but until the last one is closed, the critter can escape.

Door closing is actually one of the trickiest parts of the game. The worst thing you can do, for example, is accidentally close all four doors of an empty building. This renders it useless as a lemming cage, and condemns you to the first level of play, since you must fill all the buildings on the first level with lemmings before you can proceed to the second level.

To corral the critters, you must move the little white square which represents you over a lemming. To maneuver your player, you can use the keyboard, Apple-compatible paddles or joystick, or an Atari-type joystick with the Sirius Joyport.

We found the game impossible with a potentiometer-type joystick or paddles, very difficult with the keyboard, and only mildly frustrating with the Atari-type joystick.

To pick up or drop a lemming, you press either the button on your joystick or the spacebar.

You must avoid the senile lemmings, which cause death on contact, and it is a good idea to avoid the SPCA truck when carrying a lemming to its new home, since the truck will cart it off to be neutered, whether you want it to or not. The truck is, however, your only defense against senile lemmings, which are too slow to escape its wheels.

If you allow more than 15 lemmings to roam the streets at one time, overpopulation triggers their instinctive need to keep their numbers under control, they make "a frantic suicide dive into the sea at the edge of town," and the game is over.

Lemmings requires an unusual blend of strategy and skill. It takes some practice to be able to manipulate the joystick reliably so that you don't accidentally close too many doors, and you must develop a system for dealing with the prolific little creatures in order to succeed.

The game is cute and entertaining, and even the most inept members of the Clod Squad were able to accumulate a few hundred points. More skillful players will undoubtedly enjoy the higher levels, at which there are more empty buildings and more, faster-breeding lemmings. □

Teed Off

Dale Archibald

creative computing

SOFTWARE PROFILE

Name: HiRes Computer Golf

Type: Real-time strategy

System: 48K Apple II with Applesoft in ROM or II Plus and one disk drive, DOS 3.2 or 3.3, paddles

Format: Disk

Language: Applesoft, some machine

Summary: An early whiff of spring

Price: $29.95

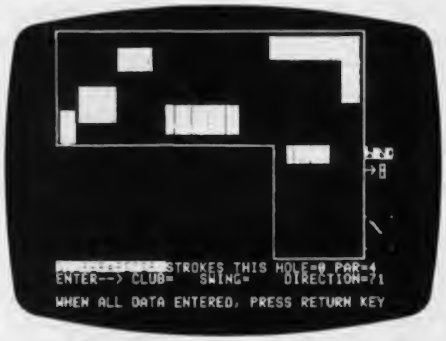
Manufacturer:
Avant-Garde Creations,
P.O. Box 30160,
Eugene, OR 97403

One member of my regular golf foursome is habitually late. Doug, Mark, and I all arrive on the tee at least two minutes early. At times we even get there early enough to take a few practice swings before it's time to tee off.

Not Lowell. Invariably, we allow first one party, then another and another to tee off while we wait because Mr. Lowell still hasn't arrived.

About the time we're ready to go without him, he roars into the parking lot, leaps out, and wrestles his lime-green bag out of his car with one hand while he struggles into his spiked shoes with the other.

When he does rush up, he jams the tee and ball into the ground, takes one practice swing and drives the ball 240 yards straight down the fairway. It just isn't fair.



So when I called Doug and Lowell to see if they'd like to try *HiRes Golf*, it was only natural that Lowell would be late. He got a chance to practice a few shots before we began the game, but only a few.

Doug and I had our golf caps on and practiced putting on the carpet while Lowell got ready.

Then, as we stood and watched, he sank a hole-in-one on the first hole. I tell you, it just isn't fair.

That gives you an idea how realistic this game is. Programmer Stuart Aronoff has done an outstanding job of blending the strategy of golf with the difficulty of hitting that little white ball. (Although he admits he's not a golfer.)

Aronoff says he wanted to write a game that wasn't an arcade type or an adventure, but "one that would be a challenge and have very little repetition."

He has succeeded. The program is an amalgam of the things that make golf interesting (and maddening). If your swing is flawless each time, you will finish in good shape. Make a mistake, or gamble and lose, and you're in trouble.

There are five courses on *HiRes Golf*, from a beginner's to a world class. As many as four players can go around at one time.

Let's step through a hole. First you can look at the fairway graphic. This could include up to three screens, and might have such obstacles as trees, water, sand, rough, or out-of-bounds. You can flip from screen to screen, or call up the view of the screen to see where the hole is. The green is broken into sections with arrows showing what directions the ball will roll.

After checking what direction the wind is blowing, and at what velocity, select your club from the 1-Wood through the wedge, (or the putter if you're on the green). Next you decide with what strength you want to hit. The 1-Wood through 9-Iron offer strengths of 6-0 (for 10). The wedge hits in increments of 10 yards. The putter hits in feet.

Dale Archibald, 1817 Third Ave. N., Minneapolis, NM 55405.

Using the game paddle, you aim the ball. Hit Return and the graphic shifts. You no longer see the first tee. Instead, you're looking at the ball from the side. Its height depends upon whether it's a tee, fairway, rough, or sand shot.

Behind the ball (to left or right, depending on where you are on the fairway) is a series of horizontal lines outlining the perfect clubpath. The club face is poised vertically at the top of the screen. Touch a key, and it begins to move.

Each time you touch it after that, the club face changes direction 22.5 degrees (as on the 1,500 meter race on Microsoft's *Olympic Decathlon*). Your object is to keep the face inside the clubpath and hit the ball at the correct angle. Go inside or outside the clubpath and you'll hook or slice the ball. You can also top it or undercut it, thereby cutting your distance. I don't even want to mention the ever-popular whiff.

To make it tougher, out of the rough or a sand trap you must hit the ball at a different angle from a fairway or tee shot.

HiRes Golf is a hilarious substitute for housebound northern and/or rainy day golfers.

If you make a perfect shot, the graphic changes to look down on the fairway as the ball sails along. You can go over water, rough, sand, and—sometimes—trees. You can't trespass over the boundaries to take a shortcut, though.

When you roll onto the green, the graphic shows the way the surface slants in different areas. You again use the paddle to aim, but needn't go through the swing steps. Just choose distance and hit Return.

Sink the putt, and your score is added to the card.

The graphics are simple (all shapes have 90 degree angles) but adequate. Sound effects add to the game.

It's a hilarious substitute for housebound northern and/or rainy day golfers. I do wish Aronoff had allowed for more than one game at a time to be saved for later play. (How can I practice if I'll lose everyone's place?)

I also think it would be much more enjoyable to have the courses modeled after actual courses. Perhaps there could be a "PGA microtour" for passionate golfers with Apples.

Oh, after Lowell made his hole-in-one, he fell completely apart. I told you it was almost like real golf. □

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KANSAS CITY, MISSOURI 64111

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Blast from the Past

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SOFTWARE PROFILE

Name: Deluxe Invaders
Type: Arcade game
System: Atari 400/800 16K
Format: Disk, ROM cartridge
Language: Machine
Summary: Finally a "genuine" Invaders implementation
Price: $34.95 disk, $40.95 ROM
Manufacturer:
Roklan Corporation
10600 Higgins Rd.
Rosemont, IL 60018

Deluxe Invaders

Your story may well be the same. Space Invaders, the first "cult" arcade game, hooked you—you, who vehemently swore your quarters would never be in short supply. It was the drum beat that did it: the quickening pulse that glazed over your eyes and tightened every muscle in your arms as you furiously raced to kill the last row of flapping insects.

Those were the days. I remember when *Invaders* first became available on cassette for the Atari computer. Finally, something had arrived to knock *Star Raiders* off the tube for a while. *Invaders* was well-animated, colorful, addicting, hilarious. But it was disappointing in its distance from the coin-op arcade game. Gone were the barriers that afforded temporary shelter from the falling "worm rays"; missing was the pace and feel of the game that was its inspiration.

Well it's been a while in coming—quite a while, actually—but the real thing is finally here. The nostalgia warms my heart. *Deluxe Invaders* faithfully captures the look, spirit, and play of arcade Space Invaders. And it doesn't stop there.

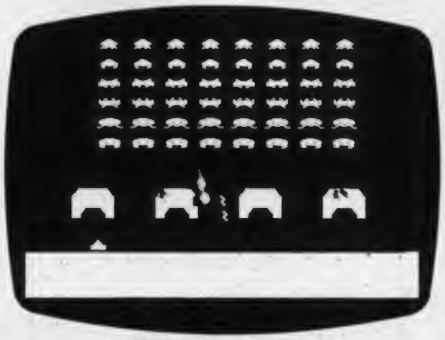
John Anderson

Deluxe Invaders retains the color, sound, and polish of the earlier Atari computer game, while remaining true to many of the features of the deluxe arcade game version. The barriers are back, as are the spinning "worm rays." Back also is the hypertensive pacing, and if you were into the game "back when," this game will go "click" when you start with it. Set aside some time.

K-razy Shootout brings nearly all the excitement of the arcade game to the Atari computer.

There are nine levels of difficulty, including some where an insect results merely in its splitting into two baby insects. Other levels include mother ships that deposit new aliens on the board in play. Even the alien shapes are truer to the original game, as is the difficulty.

The difficulty levels are not too well documented, and only experimentation will flesh them out completely. The program does allow for a two player game, along the same lines as the coin-op.



Deluxe Invaders.

"What," you say? "Another Invaders game?" You're tired of Invaders games? I said the same thing when I first saw this package. I was wrong.

Roklan has some exciting plans for the Atari computer, including *Gorf* and *Wizard of Wor*. They are also planning a track-ball peripheral. If these products are up to the standard of *Deluxe Invaders*, we're in for a real treat.

K-razy Shootout

It's sometimes fun to trace the lineage of a game like *K-razy Shootout*. First there was *Star Wars*, with its stirring laser battles in the corridors of the Death Star. Audiences bobbed, weaved, and ducked in their seats as Luke, Han, and the Princess blasted their way through countless evil storm troopers.

Next there was the coin-op game Berzerk, pitting the arcader against evil 'droids closing in for the kill. The exciting "laser shoot'em-up" mood was evoked pretty accurately, constituting the appeal of the game. What's more, the game spoke, goading you, mocking you, teasing more quarters out of you.

creative computing
SOFTWARE PROFILE

Name: K-razy Shootout
Type: Arcade game
System: Atari 400/800 8K
Format: ROM cartridge
Language: Machine
Summary: Addictive "shoot-em-up" game with classic roots
Price: $49.95
Manufacturer:
K-Byte
1705 Austin
Troy, MI 48099

Among a bevy of "laser motif" games for many systems, *K-razy Shootout* brings nearly all the excitement of the arcade game to the Atari computer. The only element that's missing is the speech. This is not to say that the Atari couldn't do it; it's simply not implemented here.

K-razy Shootout also bears the distinction of being the first ROM cartridge-based game from a third-party source. This necessarily adds to the cost of the package; but if you saw, enjoyed, and fondly recall the film *Star Wars*, you won't want to do without this program for long.

Your character runs through maze-like chambers, as 'droids close in from all directions. Using the joystick, you aim your laser, drawing a bead on them before they do the same to you. If you manage to clear a sector, you advance to the next. The action becomes increasingly furious, and you soon find yourself shooting from the hip, moving from sheer instinct, and totally addicted.

Scoring is dependent on several factors, including time, ammunition used, and 'droids' manner of demise: through hostile fire, collision, or shooting each other. In addition, you collect an extra player for every 10,000 points.

The only way you'll see sector four or beyond is through strategy. You'll discover that it's possible to get 'droids to collide or shoot each other—finding good

K-razy Shootout.

cover is also imperative. Don't collide with a wall, though. That's as fatal as being hit by enemy fire.

The graphics, sound, and smooth animation in *K-razy Shootout* far outweigh its few negative points. The ranking system is screwy: you can progress from "Goon Class 1" to a higher score, which then is ranked back at "Goon Class 4." This frustrated our playtesters. The game can be paused, but only by pressing Control-1, as if you were in Atari Basic. A much more friendly option is using the space bar to pause, a function now standard on many games.

Still, *K-razy Shootout* is lots of fun, and has a great deal of staying power. If only it could talk. □

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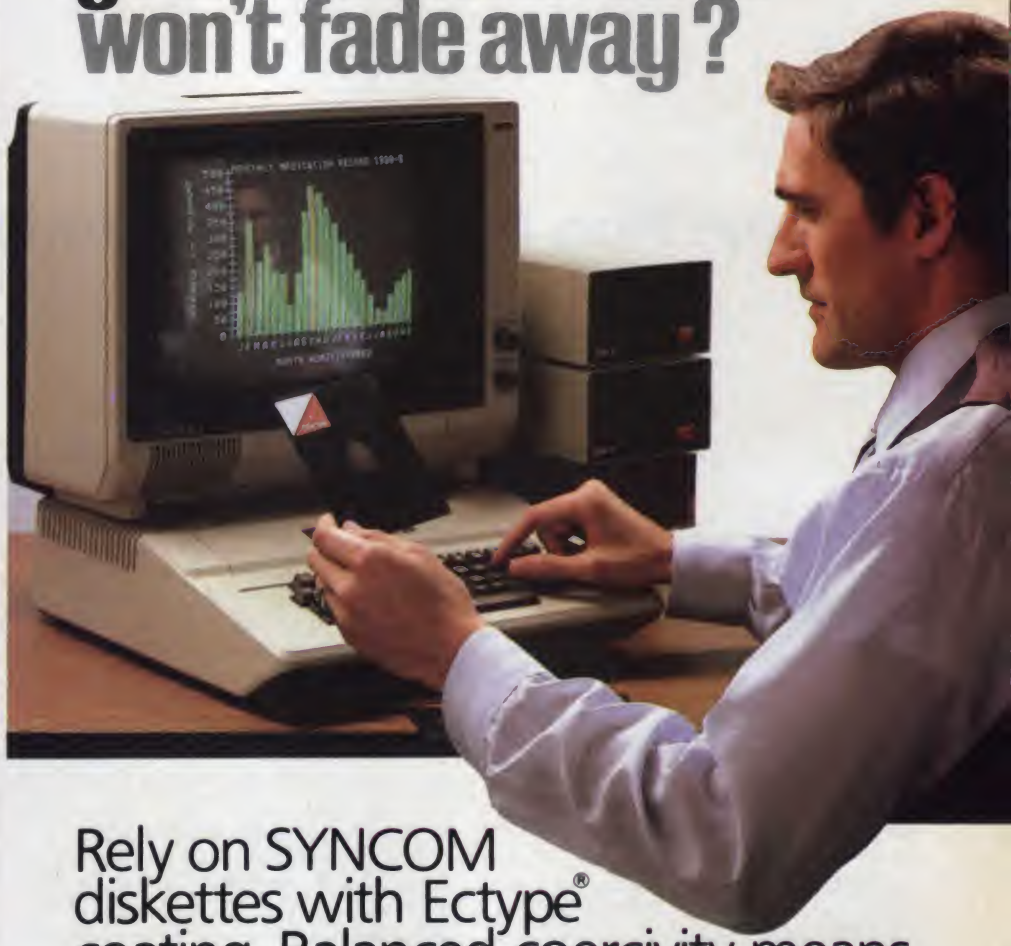

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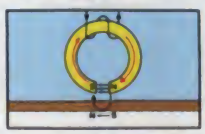

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Atari Fun for the Dog Days of Summer

Sandy Small

Dog Daze

We had just finished a picnic lunch of barbecued spareribs. I was walking the dog and as usual, when we passed a fire hydrant, he insisted upon investigating it, dragging me along on the end of the leash. David quickly grabbed a chewed bone, threw it, and hit the fire hydrant. "It's mine," he shouted gleefully.

David and I are not insane, just currently addicted to an APEX (Atari Program Exchange) game called *Dog Daze*.

creative computing

SOFTWARE PROFILE

Name: Dog Daze

Type: Game

System: 32K Atari, disk drive, 2 joysticks or 8K Atari, cassette drive, 2 joysticks

Format: Disk or cassette tape

Language: 6502 Assembly

Summary: Excellent game, lots of fun; highly recommended.

Price: $17.95

Manufacturer:
The Atari Program Exchange
P.O. Box 427
155 Moffatt Park Dr., B-1
Sunnyvale, CA 94086

Sandy Small, 11314 Yucca Dr., Austin, TX 78750.

Now, I readily agree that the game concept which uses two dogs, fire hydrants, bones, and an occasional automobile doesn't sound as thrilling as being invaded by aliens. Furthermore, I will concede that the graphics are not as fancy as the ones in Centipede or PacMan. Then, you ask, just what is so good about *Dog Daze*? Why should I buy it? That's very simple to answer. The game is fun to play.

Dog Daze opens with the melody of "How Much Is That Doggy in the Window," then plots a play area and two dogs, each a different color. Along the top of the play area is a row of sixteen fire hydrants, eight of one color, and eight of the other. These fire hydrants keep score.

The object of *Dog Daze* is to get all the fire hydrants at the top of the play area your dog's color.

You maneuver your dog with the joystick, causing him to run vertically, horizontally, or diagonally across the playfield. Neutral fire hydrants (colored blue) appear on the playfield in random locations, and your dog must run to "claim" it. When the hydrant is claimed, it turns to the color of the dog that claims it.

You can claim a neutral hydrant one of two ways. One way is to run and touch each of the hydrants as they appear, thereby changing them to your color. The other strategy is to throw your bone at it by pressing the joystick button. If you hit it, you claim the hydrant, and get your bone back automatically. If you miss, you must retrieve your bone before you can throw it again.

In the meantime, your opponent is trying to do the exact same thing, making for a furious competition to be the first to claim the neutral hydrant.

There are several hazards to be avoided. If you pass too close to your opponent's hydrant, like all dogs, you must stop to sniff for a few seconds. While you are sniffing, your oponent's dog may be claiming all the neutral hydrants in sight.

An even more serious hazard is the car that periodically swerves across the playfield. It sounds a warning honk, but if you are in the path or stuck to a hydrant in its path, you may be hit and lose the game.

Scores are calculated based on two events: each time you claim a hydrant, one-half of one of the hydrants on top of the play area changes to your color and each time you run into the other dog's hydrant, one-half of one of your hydrants changes to his color.

The only options allowed in *Dog Daze* are to limit the length of the game, which is default sixteen minutes, and to handicap yourself by starting with fewer than eight

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fire hydrants of your color. This allows a skilled player to play with someone who is less skilled.

Sound is used quite imaginatively. A variety of bleeps, bonks, and various degrading noises (when you make mistakes) are generated. The dogs are animated quite nicely; the running motions are done very well. The author obviously took great care in designing his player tables.

Dog Daze is also one of the few two player games which allows both competitors to play at the same time. Most games use an "I go first, you go second" approach.

In summary, *Dog Daze* is an excellent game. It combines the capabilities of the Atari and an unusual game concept to achieve a truly enjoyable game.

Caverns of Mars

The *Caverns of Mars* arrived recently. I had heard rumors about this new Atari game, so I immediately sat down to play it and see what all the fuss was about.

Four minutes later, I was hooked.

Four hours later, my wife dragged me away.

The plot is as follows (some of it is somewhat cliche, as it follows the lead of many, many other games.): First, there's the Sole Defender syndrome common to many games, where you alone are responsible for saving the Moon Base (Invaders) or six cities (Missile Command) or eighteen little people (Defender) or whatever. In this case, you are responsible for destroying a Martian base. In order to do so, you must penetrate a series of caverns to the lowest level, where an explodable device sits; arm it and start the countdown (by touching it); then escape before it goes off.

creative computing

SOFTWARE PROFILE

Name: Caverns of Mars

Type: Game

System: 24K Atari w/ Disk Drive or 16K w/ tape, 1 joystick

Format: Disk or Tape

Language: 6502 Assembly

Summary: Excellently done game.

Price: $24.95

Manufacturer:
Atari, Inc.
1265 Borregas Ave.
Sunnyvale, CA 94086

Should you succeed the first time, you must go through the same thing a second time, but with added obstacles, twistier corridors, and the like.

The game starts with you at the top of the cavern. It begins slowly scrolling up, so you move downward. By moving the joystick right-left you can maneuver from side to side (from a central position), and by moving it back and forth, you can increase or decrease your rate of descent.

If you pull the stick so that your ship moves upward on the screen, your ship matches the vertical speed of the caverns scrolling up past you. So your position relative to those caverns doesn't change; you have no vertical speed. But this can only last until your ship hits the top of the screen, at which point your relative velocity returns to normal. Similarly, if you move your ship downward, your velocity relative to the cavern walls is double that of no-motion.

This concept is what makes the *Caverns* so interesting, and difficult. If you don't move vertically, your rate of descent is constant and there are many places you must stop moving vertically to avoid running into the cavern walls (such as horizontal passages).

While you are descending through scenic Mars, you must destroy various installations. By pressing the joystick button, you launch two missiles downward from each side of your ship. If you hit a fuel canister (imaginatively labelled "FUEL") your fuel supply increases by 5 (of 100). If you hit other installations, you just plain destroy them. The idea is to wreak as much havoc as possible on the way down.

You can see only a limited section of the caverns. So you never know what's going to come next. You maneuver through a passageway twisting back and forth, and suddenly the screen is filled with Martian ships you must avoid, and try to blow up. But you must not collide with the ships or the wall.

If your first descent is successful you begin again. This time there are floating space mines, and force doors that open and close, and things begin to shoot back at you. Completely horizontal passages appear, requiring you to be ready for them and use nearly the full vertical screen's worth of maneuvering to get through. It gets harder and harder until you are destroyed, or somehow succeed in navigating all five caverns.

Technically, the game is excellently implemented. It's apparently done with remapped character graphics, letting the characters serve as the walls, ships, and so forth. Vertical scrolling is done smoothly and without flicker. The player tables for the ship are well laid out, and the missiles operate correctly. Sound is used well, with the usual explosions, rumbles, firing noises, and whatnot.

The Caverns of Mars has that indefinable "something" that makes it arcade-quality. Here's my best definition: When you lose in an arcade-quality game, you know why, and know how you could have done better, if you were just a little faster or if you hadn't have made that one mistake. Instead of the machine causing your destruction, it's your mistake that causes it. So, of course, you want to go back and try it again, and again, and get it right, until your fingers get cramps from holding the joystick, or until you're totally frustrated.

I recommend this game to anyone who likes fast-paced arcade games in the style of Asteroids or Missile Command and who is looking for a new challenge. □

Programming Precocity

Greg Christensen, author of *Caverns of Mars*, can't understand what all of the fuss is about. It certainly can't be the fact that he wrote an arcade action game for the Atari, or even the fact that it was good enough to win an "Atari Star" award. Perhaps it has more to do with the fact that he did so in less than two months, and despite the limitations of the Atari Assembler/Editor cartridge.

More likely it has something to do with the fact that he was 17 years old when he wrote it, after having a computer in the house for less than a year.

In addition, *Caverns of Mars* is the first program to make the transition from a package in APX, the Atari Program Exchange, to a part of Atari's main product line. Atari liked the game a lot, and invided Christensen to collaborate on the creation of a ROM cartridge version.

Young Mr. Christensen declined the offer. He has wisely decided to pursue an uninterrupted college education. Doubtless he has felt some pressure to surpass his feat, but has not succumbed. One cannot help but feel, however, that we may hear from him again.—*JJA*

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Woz and Us

Steve Wozniak speaks out on rock concerts, Berkeley and new Apples.

David H. Ahl and Betsy Staples

What do a rock concert and an Apple Computer have in common? They are both brain children of Steve Wozniak, co-founder of Apple and sponsor of the upcoming Us Festival.

We spoke with Wozniak in an effort both to cut through some of the PR hype surrounding the Festival and to get his opinion on recent developments in the personal computer industry.

The press information that announced the Us Festival back in May referred to "a union of computer technology and the traditional concept of people working together to solve common problems," an "event designed to graphically present how, by working together, our country can experience positive growth in the decade to come," and "the first meeting place where the 'computer underground' can exchange information and review major developments in computer technology... a dynamic educational experience."

What did Wozniak have in mind when he initiated plans for the Festival? "I had this neat image of Woodstock—lots of great groups in one place. I look through the newspapers every week, and I find very few concerts that I want to go to, and you never find a collection of good groups in one place. So my image was of that part of Woodstock."

He has subsequently done some research on Woodstock, including reading a book called *Barefoot in Babylon*, and "I never would have done this if I had read that book first."

How does he plan to avoid the disasters that befell the organizers of Woodstock? "We have some very professional people; we're not wild hippies with wild ideas who are just doing it for the sake of doing it. We want to make sure that it comes off well, that we look good, and that the community benefits from it. I hope it makes San Bernardino county look really good."

"The Us Festival is an event designed to graphically present how, by working together, our country can experience positive growth in the decade to come."

We asked who was financing the venture. "I'm financing it in a way, but I don't know yet if we'll make a profit. Right now we're going to lose money, but I think we are going to raise the ticket prices from the original $15.00 per day. I structured it so that I did not have much ownership of it. I had to keep 52% just so that I could say in the end, 'Yes, I want this group. No, I don't want that one.' And I want to make sure that I have a house for the night. Basically, it is structured so that I am lending the corporation enough money to do it, and then the corporation will pay me back.

"I would like to break even, but it's not currently forecasted to do that. I don't mind losing just once in my life."

According to the press release, "The Festival will be a celebration to underscore the need to shift away from the 'me' focus of the 70's to the 'us' decade of the 80's, creating an era in which Wozniak envisions people who will ask 'what's in it for us,' before asking 'what's in it for me.' "

"We've got some good ideas, and we would like to get people to start thinking about working together and cooperating rather than just complaining about how bad things are and not working to change them.

"People might look back in a few years and say that this was the start of something; we might be a focal point. But this is not a political event. We're not going to

The Us Festival will be held over Labor Day Weekend in Glen Helen Regional Park in Devore, CA. Tickets may be purchased by writing to the Us Festival, Box 9508-1157, San Jose, CA 95108 or through The Source: TCW 314. The price is $35 for one to three days.

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Woz and Us, continued...

get on stage and try to tell people a whole bunch of ideas. We are just going to nudge them a bit in that direction—maybe in our brochures. The only politics is just to enjoy being together and smile."

Technology Fair

What about the Technology Fair? "Well, I'm changing directions on the Tech Fair. At first I thought it would be a computer user group get-together to which we would invite a lot of users from clubs and have on-site competitions—how fast can you write programs to solve certain types of problems? I thought it would be a big event—like a Hamfest.

"My plan is to sell the first tickets to the Us Festival through The Source."

"But all of a sudden I realized that the music had turned out so well that there was no way you could expect all of those hobbyists to sit on the other side of the lake in their tents. Now we plan to make the technology section similar to the World's Fair. We will have demos of some creative hardware and software applications—graphics, art and music, and, of course, telecommunications. We hope to be receiving some things by satellite, and we plan to publicize it on The Source, bulletin boards, etc.

"My plan is to sell the first tickets to the Us Festival through The Source. I want to give the hobbyists the first chance to get the tickets. There will be a special camping area for them, as well as other private facilities. We want to give them preferential treatment."

New Products

We chatted a bit about some recently announced products, including the new 16-bit personal computers from Digital Equipment Corporation and some Japanese companies. We asked if those announcements would force Apple to introduce its new machine sooner than anticipated.

Wozniak responded, "I think with the Apple III Apple learned a big lesson about feeling forced to bring out a product early or on a certain date. I think Apple will be much more likely to wait until they can come out with a complete product."

Is the new computer in the final stages of development? "Yes, it is very far along,

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but sometimes it's hard to predict whether that last 10% will wind up taking 10, 20, 30, or 90% of your time. From what I hear, they are now finishing a bunch of software packages of graphics editors, word processors, and whatnot.

"As for hardware, the only problem is the floppy disk drive that we are building. It is very high density, and has been a problem for us for two years. It has been horrible."

We had heard that the new machine would use a 16-bit processor, so we asked which one. "I never call it 16-bit, because when you are writing software for it, a 32-bit machine is all you see; the architecture of the machine is 32-bit. The exact same chip will have a few extra pins for a 32-bit hardware bus transfer version.

"It's not really a 16-bit machine like the 8086 is. The 8086 has 16-bit registers, and of course, they implemented an 8-bit version of it, the 8088. But it is still the same machine.

"In that sense, although the 68000 has many 32-bit registers, it is still the same machine. You say 'load this register,' and you can load a byte, two bytes or four bytes and you are loading 32 bits. The 16-bit version of that chip just loads 16 bits of hardware at a time, but we did quite a few things to speed up even that.

"I think that it might possibly be the machine of the decade. You can do extremely fast memory moves, which help a lot in certain graphics and windowing situations or a graphics-oriented screen. I think Apple, like everyone else in the business, is heading toward a pure bit-mapped screen because memory costs so little now. Why bother considering anything else?"

"I think that it might possibly be the machine of the decade."

School Days

We next inquired about Wozniak's recent tenure as an undergraduate computer science major at Berkeley. He told us, "First of all, I go to class under a fake name. "Some people have figured it out, but I don't know whether any of the professors know. I'm in my final quarter."

We commented on the irony of the co-founder of Apple Computer studying computer science. Couldn't he teach most of the courses?

"Not really, because I'm more into finding solutions to problems. Sometimes I could teach things, but sometimes I have a lot of trouble. For example, I took a psychology statistics course and discovered that few of the psychology majors had ever used a calculator. I had the biggest advantage in the world, so I was tutoring them and writing programs in VisiCalc and Basic and on my HP calculator I was really learning it well.

"I came up with some new formulas for solving some of the problems. We had some very complicated factorial design problems that can take several hours to solve. So I came up with a great formula that was easy to solve, but I couldn't get anyone to listen to me except students.

"In my computer classes, I was just sitting back and working quietly. The first quarter I worked hard to get A's, the second quarter I worked hard enough to get B's, and this quarter I could care less."

Does he plan to go back to Apple? "I'm not sure. I'm going to take a rest first. I thought this year was going to be a rest being away from Apple, but I found myself getting to bed at 2:00 a.m. or spending all night doing assignments. I figured that if I'm going to work this hard, I'd rather be designing stuff for Apple. □

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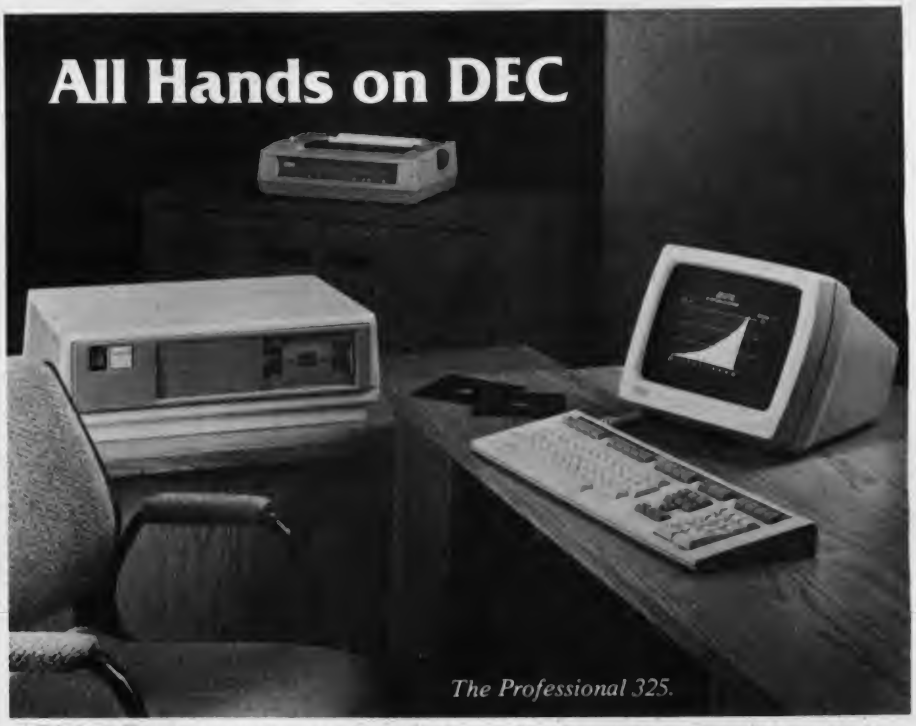

The Professional 325.

Digital Equipment Corporation has decided to join the crowd, throw its hat in the ring, and otherwise serve up its own versions of that now officially estimable machine, the personal computer.

As one might imagine, when a company like DEC jumps in the pool, it could make quite a splash. With the Professional 300 Series, the Rainbow 100, and the DECmate II, DEC promises to spark some real competition.

The Professional 325 and 350 computers use DEC's well-known PDP-11 microprocessor, which is also the brain of one of the most popular minicomputers of the past ten years. They utilize the P/OS operating system, a menu-driven subset of the RSX-11 system used by the PDP-11 mini. This allows for linkage to PDP-11 and VAX systems, as well as Ethernet and DECnet compatibility. It also makes available a large library of languages, utilities, and applications software.

The 350 can house a 5.25 Winchester hard disk option inboard, as well as an optional Telephone Management System, with autodial, autoanswer, and internal voice digitizer.

Both machines offer multitasking capability, dual floppy disk drives with 800K of storage, and communications capacities. Options available are a high-resolution color monitor, a floating point adapter allowing for faster mathematics execution, extended bit-map graphics capability, and a real-time serial/parallel interface.

The Rainbow 100 uses both a Z80 and an 8080 microprocessor. Its unique operating system has the capability to determine automatically whether the 8- or 16-bit processor should be invoked with an application program. The other chip then acts as bus controller. Thus the user can interchange software freely, and the dual-processor design speeds program execution.

Also expandable to 256K, the Rainbow 100 comes with 64K, and runs CPM/86/80 and MS-DOS. It includes dual 5.25" floppy disks, and optionally supports an external Winchester hard disk.

The machine has been designed to run a wide range of applications software, in both 8- and 16-bit formats. Word processing, a spread-sheet calculator, Basic, and "C" compiler have been announced for fall release.

DECmate II is an improved version of the DECmate I system, with optional CP/M capacity. The emphasis of this machine is on word processing, and it contains 96K of random-access memory. It also includes dual floppy disks, and the option for 8" floppy as well as external hard disk expansion.

Documents stored on 8" floppy disk are compatible with other DEC word processing systems.

The system utilizes a custom-designed microprocessor, and affords the DECmate II with one and a half times the speed of its predecessor.

CP/M option software available from DEC will include accounting, spreadsheet, and Basic packages.

The DECmate II is priced at $3470; the Rainbow 100 at $3245, the Professional 325 at $3995, and the 350 at $4495. All machines and initial software releases are scheduled for the fall.

For more information, contact Digital Equipment Corporation, Maynard, MA 01754. □

CIRCLE 342 ON READER SERVICE CARD

NEC Announces 16-Bit Machine

NEC, one of Japan's most formidable electronics concerns, has announced a 16-bit, 8086-based microcomputer for release in the U.S. in July.

The machine is dubbed the APC, for Advanced Personal Computer, and will be geared toward the business market. It will offer CP/M-86 and MS-DOS compatibility. RAM memory is expandable to 256K.

Priced to compete favorably with the IBM personal computer, the APC supports high resolution black and white or color graphics. Because the system incorporates a dual-sided 8" floppy disk drive, the APC is capable of a megabyte of storage, more than three times as much as the IBM PC. A second 8" drive can be added for $700, bringing on-line storage to two megabytes.

The NEC Spinwriter daisy-wheel printer, as well as a 100 cps, 136-column dot matrix printer will be supported.

Other features of the APC include 22 user-definable keys, a numeric keypad, and a line-drawing graphics subsystem with a resolution of 1024 x 1024 pixels. A 32-bit floating-point arithmetic processing unit for scientific applications is available for $250.

NEC Information Systems, which will market the machine, has anounced the initial release of 15 application software packages for the APD. Among these are: *Accounting Plus* packages from Systems Plus; the *Benchmark* word processor, telecommunicator, and mailing manager from Metasoft; and *MicroPlan* from Chang Laboratories.

The system will have a base price of $3,298. For more informaton, contact NEC Information Systems, 5 Militia Dr., Lexington, MA 02173. □

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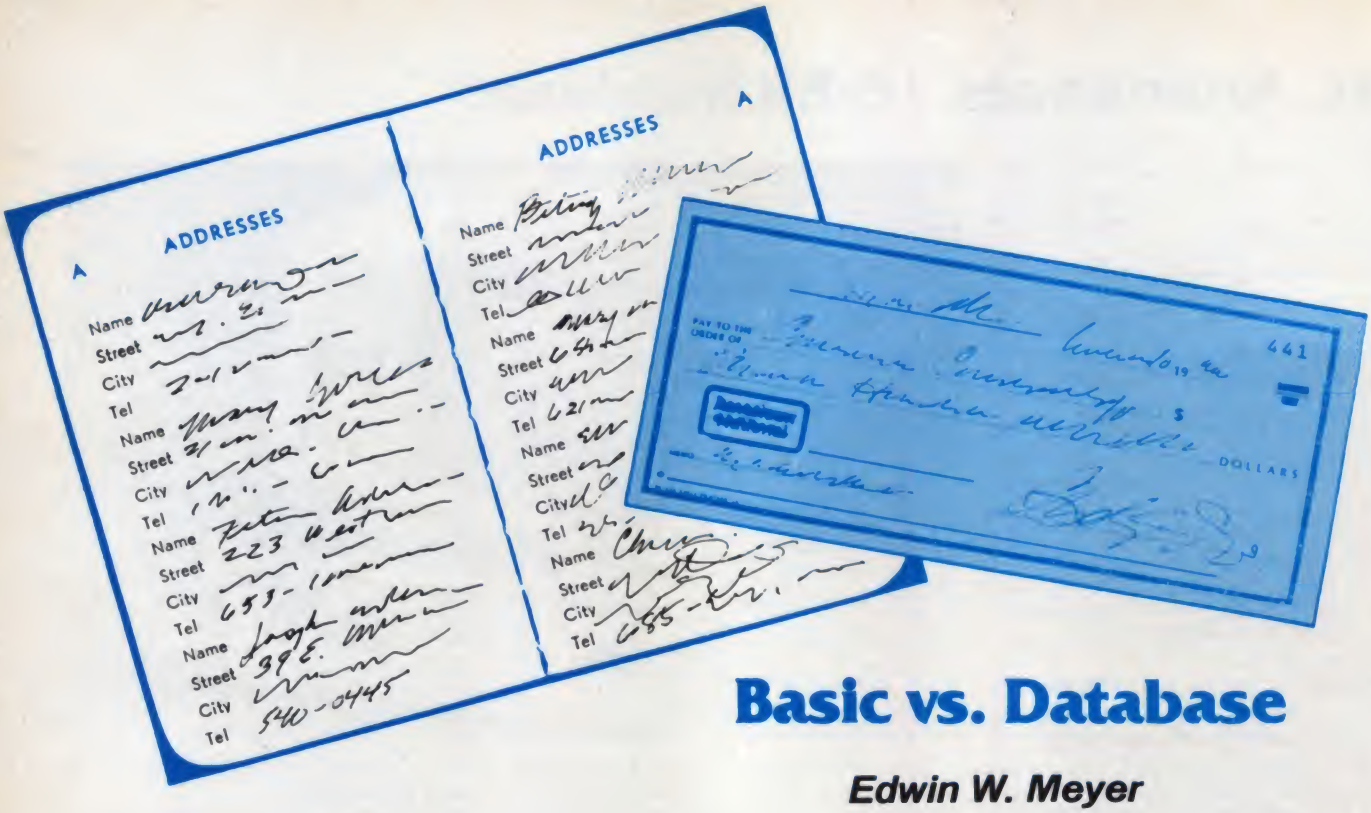

Basic vs. Database

Edwin W. Meyer

The microcomputer market is facing a crisis of sorts. While the cost of computer hardware has come down dramatically in the past few years, the cost of providing software tailored to a specific environment has remained high.

A purchaser of a microcomputer system must either be satisfied with the limited customization capabilities of current commercial software packages or be willing to pay several times the cost of the hardware to obtain a satisfactory custom-built software package.

What the computer user really needs is an application building system which is readily understandable and can be used by non-technical personnel to construct a business application program. A satisfactory solution to this problem would greatly expand the market for microcomputer systems. *VisiCalc*, a limited step in this direction, has amply demonstrated this for Apple sales.

Over the past year or so a variety of packages intended to help meet this goal have appeared on the market. All fall short of the ideal by a substantial margin. Some tend to be too complex for a non-programmer to use while others have limited capabilities. However most of these packages provide advanced capabilities at reasonable cost. Generally speaking, anybody who can write a competent Basic program can learn to write a simple database-oriented business application using one of these packages.

This article will demonstrate some database programming concepts in connection with implementing a hypothetical check register system. This system will be implemented first in Basic, then in *Condor 20*, a popular database management system for CP/M-based microcomputers.

Edwin W. Meyer, Micro Workshop of Cambridge, 1208 Massachusetts Ave., Cambridge, MA 02138.

Some Database Fundamentals

Generally speaking, a database is any coherently organized set of stored information. Some examples of databases which most people maintain are a check book register and an address book. Both have the same general organization of most common databases: an ordered sequential set of data records, each composed of separate fields. Each record in the database has the same format.

An address book is a good example. Each record in the address book database consists of the following fields: first name, last name, address, city, state, zip code, and telephone. These address records are stored in alphabetical order using the last name field of each record as a sort key.

Database Formats

The databases maintained by mainframe and minicomputers are frequently complex. However those maintained by most microcomputers generally use some variant of the indexed sequential access method (ISAM), which stores database records one after another. A program can access database records either in sequential order as they are stored in the file, or it can select a particular record based upon a particular value of a key field.

Let's take a computerized address book as an example of an ISAM file. In this case the last name field will be used as the key, so that the program might find the record of a particular person, using the last name as a search key.

Each ISAM file also has a separate index file, which relates a particular key value to a record number within the database. To retrieve the record for a particular last name without having to read each record in the database, the program looks up the key in the index file, then goes directly to the indicated record number in the database.

A database record may be stored in many different formats, the two most common of which are fixed field and comma-delimited field. In the fixed field format, each field has a fixed length and occupies a specific position in the record. This is the usual record format which relational database systems such as *Condor 20* and *dBase II* use.

In comma-delimited format, the entire record consists of printable character data. (This is not necessarily true of fixed-field format data.) A field can be of indefinite length, and commas are inserted between two adjacent fields to separate them. A field is commonly enclosed within quotation marks to avoid confusion with commas used as part of the data for a field. Basic programs perform all file operations using comma-delimited format.

Functional Capability of Database Systems

There are quite a few different database systems available for CP/M and other microcomputer operating systems. Generally they provide one or more of the following database management functions: data entry, sorting, query operations, form output, and report generation.

Data Entry. Data must be input into a database in some manner. Certain database systems provide a subsystem for operator entry of data without requiring complex programming. Many such data entry systems provide full screen input and editing capabilities, in which the operator is presented with a user-designed form with blanks to be filled.

Sorting and Merging Operations. Almost all database applications require that some kind of record reordering be done. In addition, some applications call for the records of two or more databases to be merged into a single database. Virtually all database systems provide these kinds of capability in some manner. There are also several programs available which do nothing but various kinds of sort and merge operations.

Query Operations. It is very desirable to provide a simple mechanism to allow non-technical users to examine a database and extract subsets of information from it in different formats. This mechanism is usually provided in the form of a command interpreter and is called a *query language*.

Form Output. Most database applications call for the output of printed forms. Many database systems offer an easy-to-use format defining capability for the output of these forms.

Report Generation. A report consists of a columnar format output of selected items from each record, plus headings, totals and subtotals. Database systems usually offer some kind of report generation capability.

A Sample Database Application

We will illustrate some of these database concepts by implementing a sample database application. In order to show how a database management system can substantially simplify the database programming task, we will implement our sample application first using Basic, then using *Condor 20*.

A Check Register System

The application chosen for our sample implementation is a hypothetical check register system.

This check register system should do the following: 1) Enter new checks to be issued, 2) print new checks, 3) print the check register, 4) mark canceled checks as returned by the bank, and 5) print a report of all outstanding checks and deposits.

Our check register system will be organized around a central database of check and deposit records. Each check record contains the following fields:

CHKNO—The number of this check.
DATE—The issue date of this check.
PAYEE—The name of the person or company to whom this check is made out.
AMOUNT—The amount of this check.
CANCELED—"N" if this check is still outstanding, "Y" if it has come back from the bank.

Note that we will record deposits as "deposits" in the PAYEE field and a negative number in the AMOUNT field.

Since we have chosen to not include a field specifying whether a check has yet been printed, we need at least two instances of the check register database, the main check register and the new check database. This second database is identical in format to the main check register except that it contains the newly entered checks which have not yet been printed.

The check register implementation in Basic consists of the following modules:

CHKENT—Provides for entry of information for the new checks.
PRTCHK—Prints the new checks.
PRTREG—Prints the check register.
CANCHK—Cancels checks returned by the bank.
OUTPRT—Prints a list of checks still outstanding.

The system also includes three databases:

CHKREG—This database is the main check register.
NEWCHK—This database is identical in format to CHKREG except that it contains newly entered checks not yet printed.
CANNUM—This database contains the numbers of checks returned with the latest bank statement.

Now let's take a more detailed look at these modules:

Entering the Checks

The CHKENT module asks the operator to enter data for a new check to be written. Then it adds a record containing the information concerning this check onto the end of the NEWCHK file.

CHKENT first performs an OPEN call:

```
200 OPEN "0", #1, "NEWCHK"
```

which allows the CHKENT program to write check records to the NEWCHK file, referring to it as file #1. Opening a file in "0" (for "Output") mode deletes any existing records or creates a file if one does not exist. (All examples are written in MicroSoft Basic.)

Next CHKENT uses input statements to ask the operator to provide the data for the next check:

```
2310 INPUT "ENTER CHECK NO."; CHKNO$
```

This input statement displays the prompt message "ENTER CHECK NO." on the screen, then waits until the operator enters a line terminated by the return key. Whatever the operator has typed is stored in the Basic internal variable CHKNO$. The INPUT statements for the other fields to be entered are as follows:

```
210 INPUT "ENTER CURRENT DATE:"; DATE$
230 INPUT "ENTER PAYEE":; PAYEE$
240 INPUT "ENTER AMOUNT:"; AMOUNT$
```

Now that the operator has entered all the data fields for the new check, CHKENT appends a record for this check onto the end of NEWCHK database:

```
250 WRITE #1, CHKNO$, DATE$, PAYEE$, AMOUNT$, "N"
```

Figure 1 shows a sample dialog using this program to enter a check, and Figure 2 shows several records of the NEWCHK database as the WRITE statement would output them. The record contains a copy of each variable specified in the WRITE statement, enclosed in quotes and separated by commas. This is the standard Basic "comma delimited" format.

The CANCELED field was not entered by the operator but was specified as "N" in the WRITE statement. This indicates that the check is still outstanding.

Business Application, continued...

The remaining part of CHKENT contains code to allow the operator to exit from the program or to enter data for another check. If the operator decides to exit, the program must insure that the last NEWCHK database is closed out properly. This is done as follows:

300 CLOSE #1

Figure 1. Entering a New Check—Basic Implementation.

```
ENTER CHECK NO:  106
ENTER CURRENT DATE:  8/12/82
ENTER PAYEE:  American Express
ENTER AMOUNT:  273.91
```

Figure 2. Record Format of the NEWCHK or CHKREG Databases—Basic Implementation.

```
"103","8/12/82","Herbert Forsberg, D.D.S.",
"43.56","N"
"104","8/12/82","1st National Bank of Hollis",
"473.10","N"
"105","8/12/82","American Express","273.91","N"
```

Printing the Checks

The next step is to print the newly issued checks on NEWCHK, then to append these records to the main check register database, CHKREG. The program PRTCHK combines these two operations in a single module. The first thing PRTCHK does is open the two check databases, the new check register NEWCHK for input and the main check register CHKREG for output to be appended to the end of the file.

200 OPEN "I", #1, "NEWCHK"

210 OPEN "A", #2, "CHKREG"

Note: The CHKREG database is opened in "append" mode, so new records will be appended after existing records. Some versions of Microsoft Basic do not provide "append" mode. In this case, a more involved sequence is necessary.)

Next we input a new check record from the NEWCHK database into the internal storage of Basic:

250 INPUT #1, CHKNO$, DATE$, PAYEE$, AMOUNT$, CANCELED$

Now a check must be printed using this data. This is done using several LPRINT statements.

```
300 LPRINT "       ", CHKNO$
310 LPRINT "       ", DATE$
320 LPRINT "       ",
370 LPRINT "       ", PAYEE$
380 LPRINT "       ", AMOUNT$
```

Note that the actual output form must be created in an ad hoc manner using PRINT statements with varying numbers of blank spaces and blank lines in order to get the check fields to print in the proper position on the form.

After printing the check, PRTCHK appends a new check record to the end of the main check register, CHKREG.

400 WRITE #2 CHKNO$, DATE$, PAYEE$, AMOUNT$, CANCELED$

Other parts of the PRTCHK program (not shown) loop back to print more checks and CLOSE the database files when finished.

Printing the Check Register

PRTREG prints the complete check register, but first it resets the BALANCE variable to zero.

200 BALANCE = 0

(BALANCE is to be the sum of the AMOUNT field of each check record.)

Next the main check register CHKREG is opened for input:

210 OPEN "I", #1, "CHKREG"

Then PRTREG ouputs a heading for the register report on the printer:

220 LPRINT "CHK# DATE PAYEE AMOUNT OUTSTANDING"

Now comes the section of code which prints a one-line report for each check in the register.

300 INPUT #1, CHKNO$, DATE$, PAYEE$, AMOUNT$, CANCELED$

310 LPRINT CHKNO$, DATE$, PAYEE$, AMOUNT$, CANCELED$

(Note that this illustration uses a simplified LPRINT statement, a practical implementation would use more complicated statements to obtain better column alignment in the report).

The last thing to be done with the current check record is to convert the character string value held in the AMOUNT$ variable into a floating point number, then add it to the running balance.

320 BALANCE = BALANCE + VAL(AMOUNT$)

Now PRTREG goes back to step 300 to process all other check records in the main check register in the same manner.

After all check records in the main register database have been processed, PRTREG prints the current balance inverting the arithmetic sign:

400 LPRINT "CURRENT BALANCE:",0-BALANCE

Finally the program closes the CHKREG file and exits.

Figure 3 shows a sample check register report which includes the checks shown in Figure 2.

Balancing the Check Register

Two additional programs, CANCHK and OUTPRT provide an aid to reconciling the computerized check register with the monthly bank statement.

Figure 3. Check Register Report—Basic Implementation.

CHK#	DATE	PAYEE	AMOUNT	CANCELED
	7/31/82	deposit paycheck	-1576.45	N
101	7/28/82	American Express	456.31	N
102	7/30/82	Hollis Lawn and Garden Center	43.37	N
103	8/12/82	Herbert Forsberg, D.D.S	43.56	N
104	8/12/82	1st National Bank of Hollis	473.10	N
105	8/12/82	Hollis Lawn and Garden Center	76.03	N
106	8/12/82	American Express	273.91	N

CURRENT BALANCE: 210.17

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CANCHK is a program that asks the operator to enter the check number of canceled checks returned with the bank statement, then sets the canceled field of each such check or deposit to "Y." The check numbers are stored in a temporary database, CANNUM. Each record of this database consists of a single field, the check number of a canceled check.

When the operator finishes entering all canceled check numbers, the next step is to go through the main check register, setting the CANCELED field of each check number found in CANNUM to "Y." It does this by copying each record from the main check register into a temporary file, which becomes the new main check register after the CANCHK program finishes.

As each record is read into Basic memory from the main check register, the program scans the CANNUM file to determine if this is a canceled check. If so, the canceled field is set to 'Y." Then the record is written out to the temporary file. Otherwise, the record is copied with the CANCELED field left unchanged.

When the end of the main check register is reached it is renamed to be a backup file, and the temporary check register is renamed to be a new check register.

The last program in our Basic check register system, PRTOUT, prints a report of all outstanding checks and deposits plus the total amount of these outstanding items. PRTOUT is almost identical to the CHKPRT check register report program described earlier. The only difference is that it ignores all records with "Y" values in the CANCELED field.

To implement even this simplified task in Basic would have taken several hours of programming and debugging. More involved tasks will require correspondingly greater amounts of time.

A Relational Database System

Now we will implement our check register system again, this time using the *Condor 20 Relational Database Management System*, produced by the Condor Computer Corporation of Ann Arbor, MI. *Condor 20* is a good example of a self-contained database package suitable for maintaining many of the databases found in a business environment. Unlike some database packages, it lacks a sophisticated programming language, so there is a limit to the complexity of the tasks which it can perform. However, because of this simplicity, it is fairly easy for non-technical personnel to write *Condor* procedures to maintain common databases and print forms and reports.

Condor 20 is a relational database system. This means that through the use of field names associated with each database, certain records in one database can be related to specific records in another database.

As a simple example, let's say that we want to maintain a list of all outstanding invoices for a business customer. In a relational database, there might be two different databases, a CUSTOMER database and an outstanding INVOICE database.

The CUSTOMER database contains identification data for all customers and the INVOICE database contains the data for all oustanding invoices. In this simplified example, the customer database contains only two fields, the CUSTNO, customer number, and the CUSTNAME, customer name, fields. The INVOICE database contains three fields, the CUSTNO, customer number; the INVNO, invoice number; and the INVTOT, invoice total fields.

Note that these two databases have a common field, CUSTNO. The CUSTOMER database associates customer information with the CUSTNO field while the INVOICE database associates invoices with it.

The common CUSTNO field is a link between the two databases, we can associate the customer name and address with invoice data. A database system might use this relation to print a periodic statement of outstanding invoices for each customer.

The Check Register System in Condor 20

Let's see how the check register system previously programmed in Basic might be implemented using *Condor 20*.

The first step is to define the databases which we will be using. For this check register system we will use four different databases: the NEWCHK new check database the CHKREG check register database, the CANNUM canceled check number database, and the CHECK check form database. Check, used to print newly issued checks, is the only new database. The other databases are similar to their Basic counterparts.

In *Condor 20* a database has both an internal record format and a visible form associated with it. The internal format specifies the type and length of each field in a database record, while the form defines the visual representation of such a record on the screen or when printed.

This form can be either displayed on the screen for entering records into the database or used as the actual output format for printing forms.

The form associated with the main check register CHKREG is of no concern since we will not be entering records directly from the screen or printing forms from this database. However both NEWCHK and CHECK databases need a form. The form for NEWCHK is displayed during check entry, while the form for CHECK is the actual template for printing checks.

Defining a Condor 20 Database

To define the NEWCHK database with *Condor 20*, type the command line:

DEFINE NEWCHK

to the CONDOR command interpreter. The first thing it asks for is a definition of a visual form for NEWCHK. This form definition consists of a set of underscores preceded by a field name enclosed within square brackets.

Figure 4. Record Definitions of the Check Register Databases—Condor 20 Implementation.

```
Attribute summary of Database NEWCHK

1.CHKNO:  N,5,0,99999,"                    "
2.DATE:  J,3,01/01/00,12/31/99,"                    "
3.PAYEE: AN,40,0,40,"                    "
4.AMOUNT:  $,10,-21474836.47,21474836.47,"

Record Size (Bytes) = 59



Attribute summary of Database CHKREG

1.CHKNO:  N,5,0,99999,"                    "
2.DATE:  J,3,01/01/00,12/31/99,"                    "
3.PAYEE: AN,40,0,40,"                    "
4.AMOUNT:  $,10,-21474836.47,21474836.47,"
5.CANCELED:  A,1,0,1,"                    "

Record Size (Bytes) = 60
```

The underscores indicate the screen position at which data entered for this field will appear. Cursor controls similar to those of word processing systems are provided for moving to desired positions on the screen.

When a form is complete, the DEFINE command stores it and then asks for the data types and lengths of each field mentioned in the form.

Figure 4 shows the specifications for the databases NEWCHK, and CHKREG. CHKREG is almost identical to the

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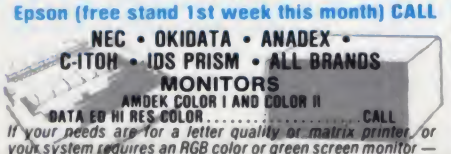

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new check database NEWCHK except for the addition of a CANCELED field. This field is not found in NEWCHK, nor is it shown to the operator entering new checks.

Like NEWCHK, the CHECK database also lacks a CANCELED field, since this information is not printed on the check. The field specification of CHECK is identical to that of NEWCHK; only the fields are printed in the desired positions on a blank check. No field names are included since only the data and not the field names are printed on the checks.

Data Entry Using Condor 20

To enter new check records into the NEWCHK database, type the command line:

ENTER NEWCHK

A blank version of the form for NEWCHK appears on the screen complete with labeled fields and underscores which indicate where the data will appear. The operator types in the data for each field, using cursor positioning to correct mistakes as needed. When complete, the new record is appended to the end of the NEWCHK database and the blank form is redisplayed for entry of another check record. Figure 5 shows a sample data entry screen.

After all records are input, the operator can view the records in NEWCHK by typing

LIST NEWCHK

The records will be displayed on the screen individually in the format used during input.

The full screen data entry section of *Condor 20* is typical of the data entry system functions of several database management systems.

As compared to the Basic implementation described above, the *Condor 20* check entry version is much simpler to create and offers greater functional capabilities, such as the ability to move among fields during record entry.

Figure 5. Entering a New Check—Condor 20 Implementation.

```
[CHKNO]   103__
[DATE]    8/12/82_
[PAYEE]   Herbert Forsberg, D.D.S._____________
[AMOUNT]  43.56_____
```

Printing New Checks

After new checks have been entered into the NEWCHK database, the system must print them. Then the new check records are added to the main check register database CHKREG. In order for the records to be printed using the check template of CHECK, the records must be copied from the NEWCHK database into the CHECK database. All records that may be in the database CHECK are first deleted, then the new check records in NEWCHK are copied onto the end of the CHECK database:

EMPTY CHECK
APPEND CHECK NEWCHK

Now we actually print the checks:

LPRINT CHECK

All the check records are printed on blank check forms loaded into the printer. Figure 6 shows an example on plain paper.

Now the just-printed check records must be added to the main check register CHKREG. Since the APPEND command works only if both the source and target databases have the exact same record format, the NEWCHK records (which lack the CANCELED field) must first be converted into the CHKREG record format:

JOIN NEWCHK XCHKREG BY CHKNO DATE PAYEE AMOUNT DATE (D)

JOIN is an operation which merges records from different format databases having some common field definitions. However, here it is used in an ad hoc manner to get the contents of the NEWCHK database into the same record format as CHKREG. The result is to "join" a CANCELED field having a default value of "N" to each record of NEWCHK. The resulting record is now in the same format as CHKREG records. (XCHKREG is an empty database having the same definition as CHKREG.)

Figure 6. The information Printed onto a Check—Condor 20 Implementation.

```
                                                  103

                                                08/12/82

    Herbert Forsberg, D.D.S.

                                43.56
```

The result of the JOIN operation is placed into a temporary database called RESULT, which can now be appended to CHKREG:

APPEND CHKREG RESULT

The final step is to delete all records from the CHECK and NEWCHK databases so new checks can be added later:

EMPTY CHECK
EMPTY NEWCHK

The preceding commands could be typed in directly from the console, but would typically be stored in a command file so that the operator need enter only a simple command such as

RUN PRTCHKS

where PRTCHKS is the name of the command file for printing newly issued checks.

Printing the Check Register

A report of the main check register plus the current balance can be output to the printer with a single command:

LPRINT CHKREG BY CHKNO DATE PAYEE AMOUNT AND COMPUTE TOTAL AMOUNT.

The "BY CHKNO DATE PAYEE AMOUNT" section of the command specifies the fields of each record which are to be output in the report and the order in which they appear. (Note that the CANCELED field does not appear in this report.) The "COMPUTE TOTAL AMOUNT" part of the command line specifies that the total of the AMOUNT fields is to be calculated and printed at the end of the report. Figure 7 shows a check register as it might be printed by this command.

Figure 7. Check Register Report—Condor 20 Implementation.

```
CHKNO  DATE      PAYEE                              AMOUNT

    0  07/31/82  deposit paycheck                -1576.45
  101  07/28/82  American Express                   456.31
  102  07/30/82  Hollis Lawn & Garden Center         43.37
  103  08/12/82  Herbert Forsberg, D.D.S             43.56
  104  08/12/82  1st National Bank of Hollis        473.10
  105  08/12/82  Hollis Lawn & Garden Center         76.03
  106  08/12/82  American Express                   273.91

Total                                            -210.17
```

That's all there is to printing the check register in *Condor 20*. Note how much simpler this is than the corresponding Basic program.

Another simple sequence prints the check register subtotaled according to payee:

```
SORT CHKREG BY PAYEE
LPRINT CHKREG BY CHKNO DATE PAYEE AMOUNT
AND COMPUTE TOTAL AMOUNT SUBTOTAL USING
PAYEE
```

First SORT is used to put CHKREG into alphabetical order according to the PAYEE field. Then the LPRINT command with the 'SUBTOTAL USING PAYEE" clause generates a subtotal of the amounts of all checks issued to a single payee. Figure 8 shows a sample report using this command.

Returned by the Bank

The next part of the *Condor 20* implementation is to cancel checks returned by the bank and produce a total of all outstanding checks. Due to its complexity, only an outline of the steps of the corresponding Basic program was presented. However, the complete *Condor 20* program is shown.

As in the Basic program, the first step is to enter all the canceled check numbers. A simple database, CANNUM, consisting of a single field, the CHKNO field, is defined for this purpose. The canceled check numbers are entered into the CANNUM database using the ENTER comand. Then a program consisting of the following steps is executed:

```
JOIN CHKREG CANNUM BY CHKNO
```

The effect of the JOIN operation is to create a temporary RESULT database containing only those check records from CHKREG having check numbers also found in CANNUM. (In this case the RESULT database has the same record format as CHKREG. However, this is not always true.)

The next step is to set the CANCELED field of these checks to "Y," and to insert them back in the CHKREG check register in place of the previous records for these checks.

Since *Condor 20* does not deal with database records individually, but can deal only with records in groups, this is done in a somewhat circuitous manner. The JOIN operation has placed all the newly canceled checks into a database named RESULT. If another temporary database is created having only the CHKREG records not found in RESULT, the two temporary databases now contain all the checks, minus the previous copies of the newly canceled check records. To merge these records back into CHKREG, the former contents are deleted and then the two temporary databases are appended to CHKREG. Finally, CHKREG is sorted on the CHKNO field to put the databases back into proper order.

```
CHANGE RESULT ST CANCELED = "Y"
COPY CANTEMP = RESULT
COMPARE CHKREG CANTEMP NOT MATCHING
CHKNO
EMPTY CHKREG
APPEND CHKREG RESULT
APPEND CHKREG CANTEMP
SORT CHKREG BY CHKNO
```

The following two commands print the outstanding checks with a total for the AMOUNT field:

```
SELECT CHKREG WHERE CANCELED = "N"
PRINT RESULT BY CHKNO DATE PAYEE AMOUNT
AND COMPUTE TOTAL AMOUNT
```

The SELECT command produces a temporary RESULT database having only those fields from the CHKREG database in which the CANCELED field equals "N" (for outstanding). PRINT generates a report of this RESULT database listing the CHKNO, DATE, PAYEE, and AMOUNT fields. The total for the AMOUNT fields is printed at the bottom of the report.

Conclusion

The previous paragraphs have shown an essentially complete implementation of the check register system in *Condor 20*. Clearly, this system would be much easier and faster to implement than the Basic version. By now I hope you are convinced that using a database system to create business applications has many advantages over programming in Basic. □

Figure 8. Check Register Report Subtotaled by Payee—Condor 20 Implementation.

CHKNO	DATE	PAYEE	AMOUNT
104	08/12/82	1st National Bank of Hollis	473.10
Subtotal			473.10
106	08/12/82	American Express	273.91
101	07/28/82	American Express	456.31
Subtotal			730.22
0	07/31/82	deposit paycheck	-1576.45
Subtotal			-1576.45
103	08/12/82	Herbert Forsberg, D.D.S	43.56
Subtotal			43.56
105	08/12/82	Hollis Lawn & Garden Center	76.03
102	07/30/82	Hollis Lawn & Garden Center	43.37
Subtotal			119.40
Total			-210.17

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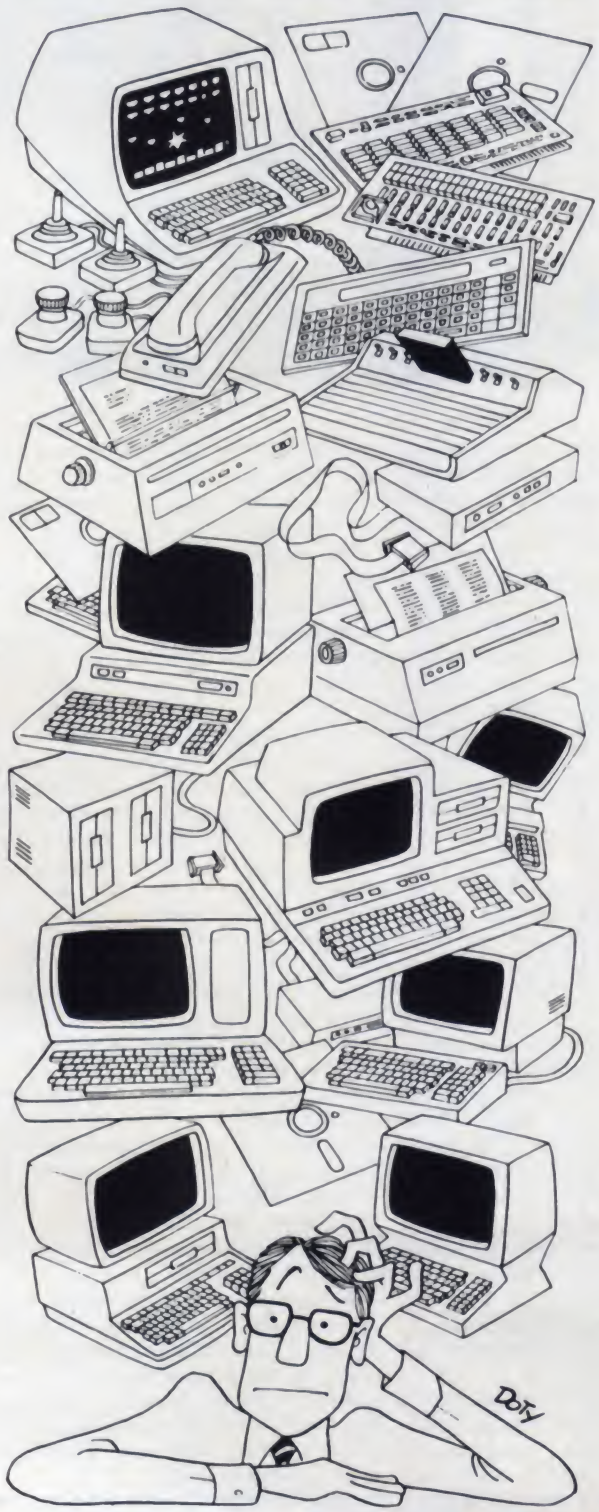

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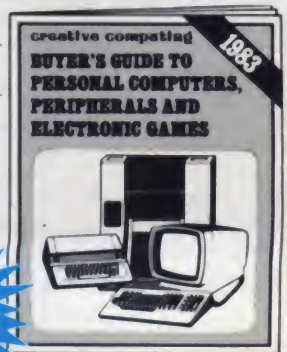

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Comparing Prices

David H. Ahl

Double digit inflation. Shrinking profit margins. Higher prices on just about everything except avocados.

Because of these factors people and organizations are doing more and more comparison shopping. Whether it's comparing supermarket ads in the newspaper or bids on a job, we all have a need to compare prices quickly and easily.

To compare prices on a few items is no particular problem; one need only jot them down on a slip of paper. On larger lists, it becomes more difficult. And when discounts and shipping charges enter the picture, the task becomes nearly impossible.

Example 1: You are a stamp collector with the usual gaps in your collection. *Linn's* or *Western* arrives each week along with circulars from mail order shops with which you have dealt in the past. Dealer A allows a 10% discount on orders over $200 while Dealer B allows a 5% discount on ten items or more although neither has the lowest prices among those you have jotted down. Problem: what is the least expensive way to get the 300 some odd stamps to fill in the gaps recognizing, of course, that your purchases will be made over a period of time.

This example is equally applicable to any type of collection—comic books, coins, Hummels, antique auto parts, postcards, etc.

Example 2: You own a retail toy shop. While much of your stock comes from major manufacturers through their reps or distibutors, you also buy some close-outs and foreign goods. You want to get some puppets and stuffed animals. You visit 200 Fifth Avenue in New York and come home with sheaves of flyers and price lists. More arrive in the mail daily and you see others in the various trade magazines. Tally it up and you have about 250 different pieces (40" monkey puppet, brown; 8" stuffed bear, purple, etc.) and 15 or 20 vendors. You don't want to put more than about $300 or $400 into stock at this time and you want the most for your money. What to buy?

This example applies to just about any type of retail store from hardware to gifts. The number of items and vendors may be different, but the problem is fundamentally the same.

Example 3: You are an arcade operator trying to maximize your profit. This means having a good choice of the latest games balanced by a cross-section of older games that still attract the quarters. You get *Play Meter* and look at the pages of classified listings of new and reconditioned games in the back. You attend the Amusement Operators Expo and pick up the circulars from the distributors. And, of course, your own distributor is always telling you he has a great deal on a like-new game that was just returned from a bum location.

You like to pick up a reconditioned game from time to time but the ads and circulars just aren't designed for comparison shopping. One ad lists games in order of decreasing price, another by ascending price, another by manufacturer, another puts the biggest movers at the top and many seem to be in totally random order.

This third example will be used to show how VisiCalc can be used quickly and easily to come to our rescue in all of the situations above.

The first step is to put the list of items into some sensible order. While ascending or descending price has some attraction, it really isn't useful because a game might fall into several spots on the list because of different pricing from different vendors. In this case, I chose alphabetical order because it made the most sense to me.

Rather than trying to assemble the names of all the arcade games and then alphabetizing, I decided to just start entering information into the computer, putting each new piece where it belonged. I took the longest list of games from a single vendor, started five lines down from the top and entered the name of the game in the first two VisiCalc columns (18 characters total) and the price in the third column (C).

If a game fell above or between those already entered, I simply opened up a row by typing /IR (insert row) and entered the new listing.

I then took the second largest vendor list and put these prices in the fourth column (D), opening up rows for new information as necessary. Ditto for the third and fourth vendor. But then trouble arose.

My computer (TRS-80 Model III) permits only six columns of VisiCalc data on the screen and adding additional vendors meant I could no longer see the game names in Columns A and B. So I simply typed /TV with the cursor on Column B which sets the first two columns permanently on the screen.

With the title columns protected in this way, to insert a new game, it was necessary to use the "go to location" function (A28 for example) to enter the title area.

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CIRCLE 134 ON READER SERVICE CARD

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Armor Attack		1400		1249		
Asteroids	1695	1550	1395			
Asteroids Deluxe	1695	1450	1495	1495		
Astro Blaster	1895	1700				
Astro Fighter		1200				
Astro Invader		995		1095		
Avalanche					295	
Barrier	695	500				
Battlezone	1195		895	1049		
Berzerk	1795	1495				1500
Bosconian	2495					
Carnival	1495	1525			795	
Centipede	2650					
Challenger	1595					
Circus				325		
Cobra Gun Ship	295					
Cosmic Avenger	1895					
Cosmic Guerilla	995				695	
Crazy Climber		1695				1400
Dambusters						
Defender	2395	2045	1995			2175
Devil Fish						
Donkey Kong	2395					
Eagle	1695					
Eliminator	2395			1895		
The End		1350				
Fantasy	2295					
Frogger	2395			2295		
Galaga	2550					
Galaxian	1795	1400	1195			
Gorf		1945	1995			1850
Grand Champion	2995					
Kaos	1395					
Kick Man	2550					
King & Balloon	1695					
Lady Bug	2295					
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Locomotion	2350					
Looping						
Lunar Lander		500		595		
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Magical Spot		995				
Make Trax	2450				1995	
Megattack	1695					
Missile Command		1350	1395	1349		
Moon Cresta		1400			895	
Moon War	2295					
Mouse Trap	2395			2349		
Ms. Pac-Man	2595					
Night Driver			495			
Omega Race				2249		
Pac-Man	2095	2350				2300
Phoenix	2295	1795				
The Pit	2350					
Polaris		1295				
Pot of Gold	2095					
Pulsar		1650				
Qix	2395					
Radar Scope	1595					
Rally-X	1495		1595			
Red Baron	1795		1395			
Rip Off						800
Robotron						
Round Up	1595					
Scramble	1695	1895				1500
Sea Wolf II		550	495	349		
Solar Quest	2295					
Space Attack	1195					
Space Chase	795					
Space Duel						
Space Firebird		1450			895	
Space Invaders	1295	800	795			800
Space Odyssey	2095					
Space War	595	475		449		
Space Zap		1100				
Spectar	1595		1295			
Star Castle		1250		1349		1350
Star Gate	2650					
Star Fire			595			
Star Hawk	750					
Star Ship I	295		395	349		
Strategy X	2295			1995		
Stratovox	1295	1295				
Sundance	695					
Super Breakout		375	395			
Super Bug			495			
Super Cobra	1595	1795			1595	2100
Super Moon Crusher	1795					
Tank				249		
Targ					495	
Tempest	2850					
Thief						
Tomahawk		1325				
Trivia Quiz	595					
Turbo	3195					
Turtles	1595					
Vanguard	1495	1695				1625
V-Day	2350					
Venture	1795					
Victory						
War Lords			1495			
Warp Warp	1495					
Warrior	695					
Zarzon	1595					
Zaxxon						

Just doing these few steps alone was enormously valuable. I had previously been impressed with Vendor B because of his $1395 price on Asteroids, $300 less than my local distributor was asking, and also his $1195 price on Galaxian, way less than anyone else. I had begun to think he had the best prices on everything and why look further. But then my simple list revealed that his $1595 price on Battle-X wasn't so good after all, and $1995 on Gorf was more than anyone else was asking. (See Figure 1.)

Since I now had all the data, it seemed sensible to let the computer look for the best price on each game. I attempted to do this by typing @MIN(C4...H4) as the entry in I4. This function selects the minimum value from the list C4, D4, E4, etc. and enters it in I4. Surprise! The minimum was 0 because several entries in the list were blank.

This, of course, was not what I intended so I tried entering the special VisiCalc @NA function in the blanks (meaning value not available). Now for the minimum I got NA. So I tried entering alphabetic characters. Still, no go.

When averaging a list, VisiCalc looks at only the non-blank values. Not so for selecting the minimum or maximum values. Hence, the only solution was to fill in the chart with values larger than would ever be found (say, 10000) which, unfortunately, makes it less readable. Alternatively, one could use a value of 1E9 (meaning 1 times 10 to the ninth power). Since the expanded form of the number will not fit in a standard width VisiCalc column, the exponential notation is retained.

Figure 1. Output from VisiCalc program shows prices on games from six vendors.

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Comparing Prices, continued...

If you wish to use this method, you should fill in the VisiCalc worksheet with 10000 or 1E9 before entering any other data by simply using the replicate command. This saves having to enter each value individually. A portion of the worksheet with 1E9 filled in is shown in Figure 2.

To make this modified worksheet move readable, I elected to format the real price entries as dollars and cents while leaving the 1E9 alone. This is done by typing /F$ before each dollars-and-cents entry. Typing it in as, say, $1995.00 will not do since VisiCalc will drop the zeroes after the decimal point. This output is shown in Figure 3.

To use these data to make a "shopping list" which shows only the lowest price on each item, one can move the last column, in this case column I, to the position immediately next to the title columns using the /M command. (See Figure 4).

Since two of the vendors were on the West Coast and I was on the East Coast, I wanted to modify their prices to reflect an extra $100 per game for shipping. This was done by using a spare column (J) and giving the command +C5+100 in position J5 followed by a /R (replicate) in J6...J109 using relative values. I then replaced the original column with this modified column using the move (/M) and delete column (/DC) commands.

All told, this entire initial comparison shopping procedure took about two hours. To update the list each month (or whenever the occasion arises) takes no more than 15 minutes. The potential savings are hundreds or possibly thousands of dollars, a more-than-satisfactory return on my investment of time and computer resources. □

	Vendor A	Vendor B	Vendor C	Vendor D	Vendor E	Vendor F	Min Price
Alpine Skier	2495	1E9	1E9	1E9	1E9	1E9	2495
Amidar	2395	1E9	1E9	1E9	1E9	1E9	2395
Armor Attack	1E9	1400	1E9	1249	1E9	1E9	1249
Asteroids	1695	1550	1395	1E9	1E9	1E9	1395
Asteroids Deluxe	1695	1450	1495	1495	1E9	1E9	1450
Astro Blaster	1895	1700	1E9	1E9	1E9	1E9	1700
Astro Fighter	1E9	1200	1E9	1E9	1E9	1E9	1200
Astro Invader	1E9	995	1E9	1095	1E9	1E9	995
Avalanche	1E9	1E9	1E9	1E9	295	1E9	295
Barrier	695	500	1E9	1E9	1E9	1E9	500

Figure 2. Portion of the same price list as in Figure 1 with 1E9 filled in where no price is available. This allows selecting the minimum value in the last column.

	Vendor A	Vendor B	Vendor C	Vendor D	Vendor E	Vendor F	Min Price
Alpine Skier	2495.00	1E9	1E9	1E9	1E9	1E9	2495.00
Amidar	2395.00	1E9	1E9	1E9	1E9	1E9	2395.00
Armor Attack	1E9	1400.00	1E9	1249.00	1E9	1E9	1249.00
Asteroids	1695.00	1550.00	1395.00	1E9	1E9	1E9	1395.00
Asteroids Deluxe	1695.00	1450.00	1495.00	1495.00	1E9	1E9	1450.00
Astro Blaster	1895.00	1700.00	1E9	1E9	1E9	1E9	1700.00
Astro Fighter	1E9	1200.00	1E9	1E9	1E9	1E9	1200.00
Astro Invader	1E9	995.00	1E9	1095.00	1E9	1E9	995.00
Avalanche	1E9	1E9	1E9	1E9	295.00	1E9	295.00
Barrier	695.00	500.00	1E9	1E9	1E9	1E9	500.00

Figure 3. Formatting real prices into dollars and cents makes the list more readable.

	Min Price
Alpine Skier	2495
Amidar	2395
Armor Attack	1249
Asteroids	1395
Asteroids Deluxe	1450
Astro Blaster	1700
Astro Fighter	1200
Astro Invader	995
Avalanche	295
Barrier	500

Figure 4. Moving the minimum price column next to the game name makes a convenient shopping list.

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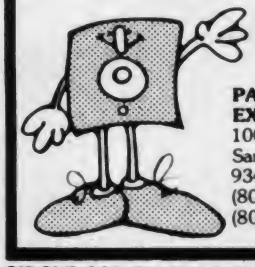

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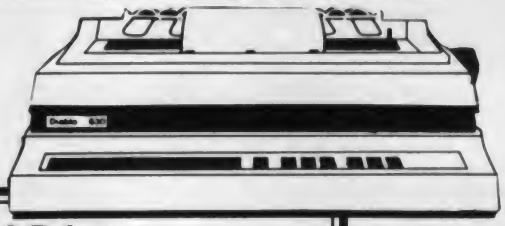

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CIRCLE 196 ON READER SERVICE CARD

The Graph Paper

Part Three: Moving Experience

David Lubar

Last month, we ended with a section on shape tables. This time, we'll put shape tables to use and begin animation. While there is no great secret to animation, almost every programmer has his own approach. And though these varied approaches share many common attributes, there is enough diversity that you can often tell the author of a program just by looking at the graphics. So I'll provide the basics, and you'll probably find your programs quickly moving in whatever direction seems most appropriate to you. First, a look at the two commands used in Applesoft to draw shapes.

Chest of Drawers

To draw something on the screen, you first need a shape table in memory, and the address of the table has to be stored in locations $E8 and $E9, using lo byte, hi byte format. (To get these values from a decimal number, divide the number by 256. The result provides the hi byte while the remainder provides the lo byte. If you don't want to convert the values to hex, just poke them in from Basic.)

If you don't have a shape table handy, go into the monitor and type 6000:01 00 04 00 04 00. Then type E8:00 60. This creates a shape table consisting of a single dot. Not very exciting, but handy for quick tests. Before drawing the shape, some preparation is necessary.

First, of course, you must get into the graphics mode with the HGR command. Also, a color must be specified. The colors for drawing are the same we used for plotting last month.

Two other parameters are needed: scale and rotation. Scale determines the size of the shape, and rotation determines how it will be oriented. When scale is set to 1 (this is done with the command SCALE=1), the shape will be drawn exactly as it was created. With a scale of 2, each vector will be repeated. When scale equals three, each vector will be done three times, and so on.

Rotation is done with ROT=N where N can range from 0 to 63. A rotation of 0 places the shape the way it was created. A value of 16 rotates the shape 90 degrees clockwise. To go 180 degrees, use 32, and to go 270 degrees, use 48. In essence, every increase of 8 rotates the shape by 45 degrees.

While rotation can be increased by smaller amounts, there are two problems. First, small rotations aren't recognized by shapes with small scales. At a scale of 1, the only available rotations are 0, 16, 32 and 48. At a scale of 2, rotation can be used in steps of eight. At 3, you can go in steps of 4. A scale of 4 allows all even rotations, and any scale from 5 up can use all rotations.

The other problem is that rotations other than in steps of 90 degrees just don't look good. Even 45 degrees will produce a distorted shape. One final word on rotation; if a value greater than 63 is used, it is treated in a MOD 64 fashion (MOD N means take the remainder of a number after division by N, so a rotation of 64 is equal to one of 0, 65 is equal to 1, and so on).

Rotation and scale do not have default values. You can't assume the computer will set them properly, so it is a good idea to do so in your program. To draw the shape as it was created use ROT=0 and SCALE=1. (Note that a scale of 0 is actually the largest available scale, rather than the smallest.)

DRAW uses an X and Y coordinate. DRAW 1 at 10,40 will place the first shape ten dots in and forty down from the upper left corner (location 0,0). The coordinate location actually specifies the place where the first part of the shape will appear.

As was covered last month, a shape table is a series of commands to plot or not plot and then move. The first plot (or non plot) occurs at the given coordinate. From there the points will follow the vectors in the table. It is important to remember this when creating shapes. If you are doing a character set, the letters must all be created with the same starting point, such as the upper right corner.

If the DRAW command is given without coordinates, it starts the shape at the location of the hi-res cursor. This is convenient for linking shapes. For example,

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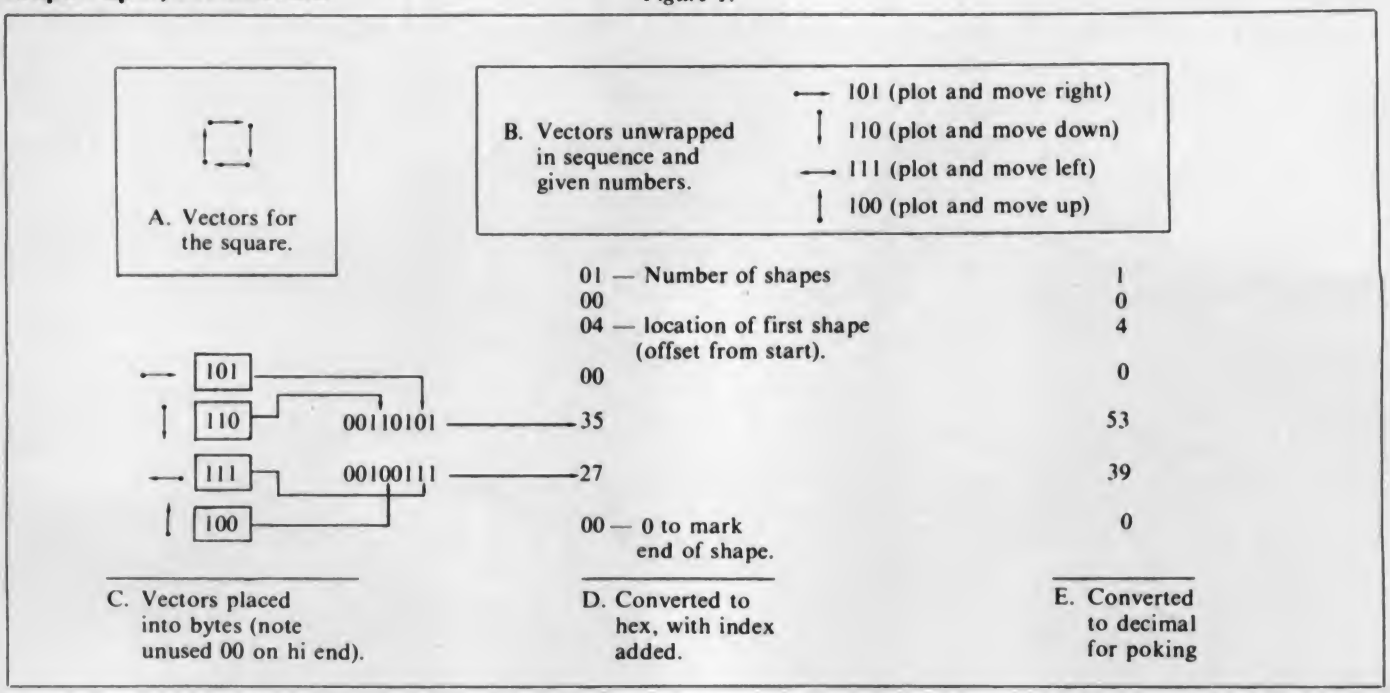
CIRCLE 233 ON READER SERVICE CARD

Figure 1.



you could draw a spiral on the screen by first creating a small shape that was a straight line, and then giving a series of DRAW commands while changing scale and rotation. The end of each segment would be the starting point for the next. (Actually, the end is determined by the final move after the last plot in the shape definition.) Even when DRAW is used without coordinates, it still requires a shape number.

Besides DRAW, Applesoft offers XDRAW, a rather powerful method of handling multiple images. XDRAW performs an exclusive or of the shape definition against the screen. This logical operation is one of the most powerful available. If both the shape and the screen have a bit set in a certain location, XDRAW will turn off the pixel on the screen. (A set bit is a binary 1. The binary number 00000001 has only the lo bit set.)

If only the screen or the shape has a bit set, a pixel will be left on by XDRAW. If neither has a bit set, the pixel will be off. The power of this is that once a shape is drawn, it can be erased by repeating the XDRAW.

Take the following example, using a shape of one dot. If the background is black, the XDRAW will plot the shape since the shape has a bit set while the screen doesn't. A second XDRAW at the same location will result in the bit from the shape being exclusive ored with the bit now on the screen, producing a 0 or off pixel. Thus the screen is restored. If the background originally had a bit set, the first XDRAW would turn it off, while the second would restore it. So XDRAW simplifies the process of erasing shapes, and prevents the problem of a shape destroying the background.

The method even works with multiple shapes. Several shapes can be drawn on a background, then removed, leaving the original screen intact. And the order of drawing and removal doesn't matter. But there is a tradeoff. When a shape crosses a background, the portions that were on will turn off. You've probably seen this effect in early Apple games. A solid object crossing a white line suddenly has a black line through it.

XDRAW has the same parameters as DRAW, it can be used with coordinates or linked, and must contain a shape number, but doesn't use HCOLOR since it merely turns bits on or off regardless of their location.

The concept of animation is actually very simple. Place something on the screen, erase it, then place it elsewhere.

Now that we have all the basic requirements for putting an image on the screen, let's get on to actual animation.

Move It, Buddy

The concept of animation is actually very simple. Place something on the screen, erase it, then place it elsewhere. If the new location is not too far from the old, and the process is done quickly, the eye believes it has detected motion. You can produce animation on the text page in this way. For a trivial example, see Listing 1.

Listing 1.

```
10  HOME
20  FOR I = 1 TO 39
25  VTAB 1
30  PRINT  TAB( I)" A"
40  NEXT I
```

To do animation on the hi-res screen, you must perform the same draw, erase, redraw sequence. Actually, it is easiest to think of the process in three separate stages. First comes the initial draw which places the object on the screen. Next there is a sequence of erase-redraw, repeated as often as the program requires. Finally, if the shape is to be removed, there is one final erase.

For a simple example, let's make a hi-res object bounce around the screen. Since this is the first animation program of the series, and since it contains some essential concepts, I'll go over it in excruciating detail, recounting the steps I went through writing the program.

First, I needed a shape. A small square seemed appropriate. Being lazy, I decided to make it with only one dot per side and use the scale function to increase its size. So the vectors of the square, starting in the upper left, are plot and move right, plot and move down, plot and move left, then plot and move up.

To make the table, I drew these vectors on a piece of paper, then wrote their numbers next to them. The numbers were put together in pairs, producing the shape information (see Figure 1). An index was added, as explained last month, producing the full table.

The first thing the program does is POKE the table. The table is placed at $6000. Since $1000 is 4096 decimal, I used 6*4096 for the base address. This way, I can look at the program later and know where I put the table without bothering to convert the number back to hex.

Next, the table address is POKED into $E8 and $E9 (note that the decimal value 96 is used for the hex hi byte of 60). With the table in memory, it was time to figure out how to make the shape move.

Motion requires a change of location. The variables DX and DY represent this. The chosen value of 1 means that the X and Y location of the figure will change by 1 each time.

Next, I needed a starting location. The values chosen for X and Y are somewhat arbitrary. I wanted the figure to start out near the center of the screen, but not exactly in the middle. Line 60 sets up the graphics mode, color, rotation and scale.

As mentioned, scale is used here to draw the shape in a bigger size than the original. Line 70 is the first step in the animation cycle. It simply places the object on the screen.

Now comes an important concept. If something is moving, you should know both where it is and where it will be. This requires a second set of variables. PX and PY (the P is for "previous") keep track of the most recently plotted position. This will be used later to erase the shape.

Next, the new location is calculated by adding DX to X and DY to Y. While this produces a change in location, the screen isn't infinite, so a check for boundaries is required. If the X value is too large or too small (in other words, if the shape has hit the edge of the screen), the sign of DX is changed. From here on it will be adding -1 until the next change. The same thing happens for the Y coordinate.

Now it's time to erase the old shape and draw a new one. All the required values have been calculated, allowing the erase and draw to be as close together as possible. This is important for reducing flicker.

Line 120 first erases the old shape. As mentioned, two XDRAWS of the same shape in the same location will remove the shape. It was XDRAWN once at line 70. The XDRAW at 120 will erase it. Following this comes a command to redraw the figure at the new location. The program then loops back to 80 and repeats the process forever.

That, basically, is all there is to animation. While faster and more sophisticated routines are required for doing games, this simple program contains many of the concepts we will be exploring in coming months. I should stress that this program is just a framework. There is much to explore and change. Try using different values for DX and DY. How great a change is possible without getting a jerky motion? Is anything gained by drawing the new shape before erasing the old one? For a bigger challenge, try putting in paddle control of the shape.

If something is moving, you should know both where it is and where it will be.

If you want to use a colored shape, you must make DX an even value such as 2 or 4. Otherwise, the color will change whenever the figure moves. To get more than one color in a shape, create the shape with every second horizontal point set. On different vertical lines, switch the pattern so the other set of dots is on. When this shape is drawn in white, two colors appear.

Listing 2.

```
1  REM  THIS PROGRAM BOUNCES A SH
     APE AROUND THE SCREEN
2  REM  FIRST STEP IS TO POKE THE
     SHAPE TABLE
10 BASE = 6 * 4096
20  FOR I = BASE TO BASE + 6
30  READ A: POKE I,A: NEXT I
40  POKE 232,0: POKE 233,96: REM
     POKE TABLE ADDRESS
50 DX = 1:DY = 1:X = 100:Y = 50
60  HGR : HCOLOR= 3: ROT= 0: SCALE=
    8
70  XDRAW 1 AT X,Y
80 PX = X:PY = Y
90 X = X + DX:Y = Y + DY
100  IF X > 270 OR X < 1 THEN DX =
     - DX
110  IF Y > 151 OR Y < 1 THEN DY =
     - DY
120  XDRAW 1 AT PX,PY: XDRAW 1 AT
    X,Y
130  GOTO 80
200  DATA   1,0,4,0,53,39,0
```

The dots on the even locations have one color, those on odd locations have the other color. By using white 2 (color 7), the other pair of colors will appear on the screen. While the two pairs of colors can't be mixed in a shape, this method does allow for two colors at a time.

One more thing before we continue; if a shape goes past the edge of the screen, it will wrap around and appear on the other side. There is no way to prevent this other than by checking for the edge and using a series of shapes.

While the above program does produce animation, it also produces a fair amount of flicker. There is only one way around this, which brings us to a topic many of you asked about in your letters. As Walter A. Kuhn, this month's winner of *Shape Master*, asks, "Is it possible to use HPLOT and DRAW on the hi-res page which is not being displayed? The answer is, indeed, yes.

You may be wondering why anyone would want to draw on the unseen page. Consider this: Applesoft animation flickers because the shape is not always on the screen. The time between erasing and redrawing is just too long, even when the commands are right next to each other. Also, the program is not timed with the scan gun of the television so the shape can be caught in transition. But what if the shape were never erased when it was on the screen? There would be no flicker. And that's what page flipping is all about.

Like many aspects of programming, it is simple once you understand it. The only trick is keeping track of everything, and the computer is fully capable of doing that for you. Where the first program consisted of an erase-redraw cycle, page flipping requires a few extra steps.

Start with a shape on hi-res page 1. Next, draw the shape in a new location on page two, then make page two the visible page. Now erase the old shape on page 1 and

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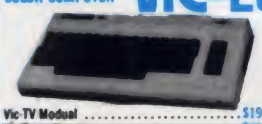

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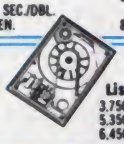

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CIRCLE 184 ON READER SERVICE CARD

Listing 3.

```
1  REM  ANIMATION USING PAGE FLIP
     PING
10 BASE = 6 * 4096
20  FOR I = BASE TO BASE + 6
30  READ A: POKE I,A: NEXT I
40  POKE 232,0: POKE 233,96: REM
     POKE TABLE ADDRESS
50 DX = 2:DY = 2:X = 100:Y = 50
55 PAGE(0) = 32:PAGE(1) = 64:FLIP
     = 1:SWITCH = 230:DISPLAY =
     49236
56  HOME : HGR2
60  HGR : HCOLOR= 3: ROT= 0: SCALE=
     8
65  POKE 49234,0: REM  FULL SCREE
     N GRAPHICS
75  XDRAW 1 AT X,Y
80 PX = X:PY = Y
90 X = X + DX:Y = Y + DY
100  IF X > 270 OR X < 1 THEN DX =
     - DX
110  IF Y > 151 OR Y < 1 THEN DY =
     - DY
121  POKE SWITCH,PAGE(FLIP): REM
      SET UP FOR DRAWING ON THE
     UNSEEN PAGE
122  XDRAW 1 AT X,Y
123  POKE DISPLAY + FLIP,0: REM
     DISPLAY THE NEW PAGE
124 FLIP =  NOT FLIP: REM  CHANGE
      BETWEEN 0 AND 1
125  POKE SWITCH,PAGE(FLIP): REM
      SET UP TO ERASE ON THE UNSE
     EN PAGE
126  XDRAW 1 AT PX,PY
130  GOTO 80
200  DATA   1,0,4,0,53,39,0
```

draw it in a new location. Display page one again, and so on.

There are only two new concepts here. First, switching visible pages, and second, drawing on the unseen page.

The visible page is controlled by poking 49236 and 49237. The value POKED there doesn't matter. Any value POKED into 49236 will cause page 1 to be displayed. Any value placed in 49237 will make page 2 visible.

The trick to drawing on the unseen page is just as simple. When you give the HGR command, Applesoft places a 32 in location 230. This value is used for indexing and calculating various hi-res functions. When the command HGR is used, a 64 is placed in location 230 (note that 32 is hex 20, 64 is hex 40, and the hi-res pages start at hex locations 2000 and 4000).

If you change the value, Applesoft won't know the difference. It will blithely plot on either hi-res page, no matter which one is displayed. Listing 3 produces a bouncing square using page flipping. Rather than keep track of which page is which, a simple Boolean variable is used. It alternates between 0 and 1, allowing alternating strobes of locations 49236 and 49237. It is also used to index the two values placed in location 230.

There really isn't that much difference between the two programs. The POKE to 49234 is used to produce full screen graphics. Otherwise, the text window will flicker. The POKE to PAGE determines where the shape will be drawn, and the POKE to SWITCH controls which page is displayed. Compare the results of this program to the previous one. It is much cleaner though the image will occasionally "tear" due to being out of phase with the TV. Again, experiment with it and see what happens.

Other Matters

I must thank you again for all the letters. Many of the questions raised will be covered in following articles, including paddle control, sound, collision detection, Applesoft entry points, and advanced machine language animation. If I miss something, or if an explanation isn't clear, please let me know. I'm always willing to backtrack.

Last month, I listed a short program that produced a ladder in the shape of a sine wave and promised to give some animated versions. Since time and space have run out, that will have to wait until next month. Meanwhile, armed with the basics of animation, see what you can do to get that ladder moving. □

APPLE SPEAKS INTELLIGENTLY!

The people who dared to teach Atari to talk are again challenging the microcomputer establishment with the VOICEBOX Speech Synthesizer for Apple. This low cost intelligent peripheral can speak thousands of words unassisted, generated directly from its firmware ROM dictionary located on its plug-in card. This means that speech, with variable intonation and speed, can be used in any of your apple programs without ever having to bother loading a disk. And, in case you want to expand your dictionary to include unusual words or words in foreign languages, you can easily define them with our 64 phonemes and store them by the thousands on one of the six special dictionaries provided for on our disk.

In addition your VOICEBOX for Apple can be easily coded to sing on key with uniform barlengths and you can store (record) your songs on disk, retrieving and modifying sections whenever you want. With the disk system, you'll also enjoy an educational random sentence generator and graphic speech animation! The VOICEBOX for Apple will run on 32K Apple II with Applesoft or Apple II Plus systems equipped with sixteen-sector disk drives. VOICEBOX for Apple comes with loudspeaker and disk. The Alien Group also makes a less expensive VOICEBOX for Apple with all features (including expandable disk dictionary), but excluding firmware ROM and singing capability. Speaker is optional on this unit.

For Atari users, the VOICEBOX for 16K and up Atari plugs directly into the serial port. No extra cables are needed and no speaker is needed since the speech comes directly over your TV monitor. This unit has all speech synthesis features except singing and firmware ROM.

AL-3001 VOICEBOX for Apple. With firmware ROM, singing capability and speaker $215.00
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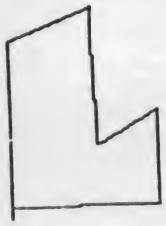
Logo Ideas

Robert Lawler

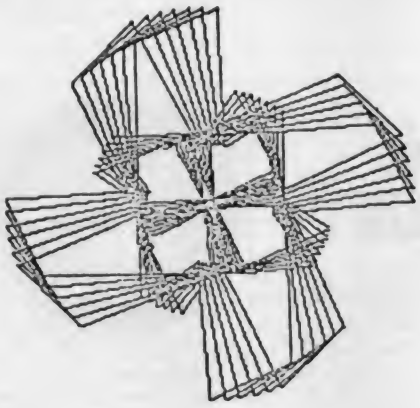
Do It Again

A ten-year old girl met the Logo language for the first time. She didn't have any idea of what to do or what could be done. She started to draw with the turtle, making it go forward different amounts and turn various numbers of degrees. Sometimes she didn't like the latest line the turtle put on the screen and wanted to erase it. The turtle didn't have an eraser, so she used a clever trick: whenever she liked an addition to her drawing, she would code it into a procedure she wrote as the drawing developed; when she didn't like a change, she would clear the screen and execute the procedure, that way re-creating the drawing as it looked before the latest change. She completed her effort with a drawing that looked a bit like a boot, as you see below:

Boot



25 Boots



The girl had given Logo a fair chance, worked dutifully, had some good ideas, but she was basically bored. "Is that all the turtle can do?" she asked. For no very good reason, she executed her BOOT procedure again. The second boot drawn over the first was rotated through a large angle. She did it again, and again, and again, becoming caught up in the design that was emerging from repeating her BOOT. Finally, she cleared the screen and executed BOOT 25 times in rapid succession under control of the REPEAT command. She was thrilled with the design above which emerged from her doing it again.

Summary

Repeating a specific list of commands can have interesting results if the executions "add up." The ways to do it again are by re-keying, naming the commands as a procedure and re-keying the name; executing a named procedure under the scope of a repeat command; recursive invocation; and looping.

Robert Lawler, Centre Mondial Informatique Et Resources Humaines, Paris, France.

Do Something A Little Different

One of the basic procedures most people work out when starting Logo is a procedure to make a square. If you are willing to stop the turtle with "control G," this procedure will do quite nicely:

```
TO SQUARE
FORWARD 100
RIGHT 90
SQUARE
```

If you want to do something a little different, you might pick out a command operand, such as 100 and turn it into a variable. Doing so would permit you to make squares of any size.

```
TO SQUARE :DISTANCE
FORWARD :DISTANCE
RIGHT 90
SQUARE :DISTANCE
```

If you want to do something a little different, you might consider changing the value of distance in every invocation of SQUARE. You would have a SQUARE.MAZE procedure:

```
TO SQUARE.MAZE :DISTANCE :CHANGE
FORWARD :DISTANCE
RIGHT 90
SQUARE.MAZE (:DISTANCE + :CHANGE)
  :CHANGE
```

If you want to do something a little different, you might look at the operand of the second command in the procedure and turn that 90 into a variable. You would then have what has become known as a POLYSPI procedure (can you find some of the many good numbers for angle?):

```
TO POLYSPI :DISTANCE :ANGLE :CHANGE
FORWARD :DISTANCE
RIGHT :ANGLE
POLYSPI (:DISTANCE + :CHANGE) :ANGLE
  :CHANGE
```

If you want to do something a little different, you might think of applying the change value to the variable ANGLE instead of to DISTANCE. You would then have what has been called the INSPI procedure (be certain to try INSPI 5 0 7):

```
TO INSPI :DISTANCE :ANGLE :CHANGE
FORWARD :DISTANCE
RIGHT :ANGLE
INSPI :DISTANCE (:ANGLE + :CHANGE) :CHANGE
```

If you want to do something a little different, you might ask yourself about symmetrical versions of the POLYSPI and INSPI procedure. Or ask yourself *why* the procedures generate the attractive designs they make. Or ask if you can apply in other places the idea of isolating some single element of a procedure and changing it to create new things and to understand them. □

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CIRCLE 173 ON READER SERVICE CARD

International Computer Problem Solving Contest II

Donald T. Piele

Approximately 3000 students at 400 contest sites located in 44 states and 16 foreign countries participated in the Second Annual International Computer Problem Solving Contest sponsored by The University of Wisconsin—Parkside. The contest was held on Saturday, April 17, 1982. The number of teams competing at each site ranged in size from a single team made up of the only kid in town who owned an Apple II—to the entire southeastern portion of the state of Wisconsin, where 50 teams descended upon the University of Wisconsin—Parkside carrying their micros with them. Placed into three divisions (Elementary (grades 4-6), Junior (7-9), and Senior (10-12)), teams of up to three students each plugged in their machines and prepared for the programming challenge: solve five problems within two hours.

When the smoke had cleared and the last sample run had come reeling off the faithful Paper Tiger, students and machines rested while the local judges went to work. Local winners were announced and, depending upon the organization of the local contest, prizes awarded.

If a team correctly solved four or five of the problems, the contest director sent us their work. If not, the director simply reported the results, encouraged his teams to finish the problems, and often remarked in a note to us " look out for us next year!"

Team Effort

Many local contest directors were surprised at the enthusiasm displayed by students for this competition—independent of individual performances. Teams who managed to solve only one problem came away determined to finish the remaining problems and improve their score next year.

Local teachers and contest directors often wrote to request more problems to give to their eager teams. Cooperation between students working on the problems together helped establish the value of the team effort.

Your Turn

Following is a copy of the 1982 International Computer Problem Solving Contest. If you are a student (or just an interested reader) and want to compare your computer programming ability with those who entered the contest this year, here is your chance. Before looking at the problems, read the rules of the contest, get yourself one or two partners, set aside a two-hour time period, read the problems, and go to work.

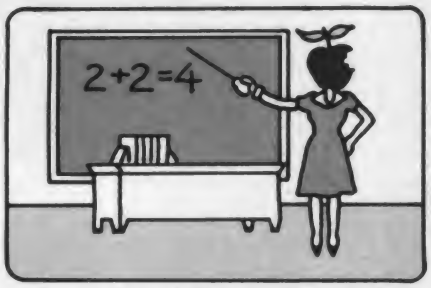
If you are a teacher, you can structure a session for the students in your classes who might enjoy a programming challenge. The solutions written by the winning teams will appear in this column next month. The results of the contest will be provided so that you can compare your performance with the very best in the country. Happy programming.

More Problems

If these aren't enough for you, there are many more problems available to challenge your creative computing skills. Problem sets from previous contests have appeared in *Creative Computing* (Sept. 1979, pp. 152-153; Feb. 1981, pp. 86-92; and Oct. 1981, pp. 140-148). □

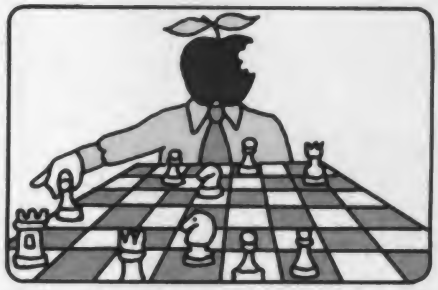
Donald T. Piele, The University of Wisconsin—Parkside, Kenosha, WI 53141.

How can you turn your Apple into



A schoolteacher?

An accountant?



A game opponent?

A security guard?

A secretary?

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THE UNIVERSITY OF WISCONSIN-PARKSIDE

SECOND ANNUAL

INTERNATIONAL COMPUTER PROBLEM SOLVING CONTEST

April 17, 1982

RULES

Divisions:	**Senior**	**SR:**	**Grades 10-12**	**(age ≤ 18)**
	Junior	**JR:**	**Grades 7-9**	**(age ≤ 15)**
	Elementary	**EL:**	**Grades 4-6**	**(age ≤ 12)**

All students should be classified by grade or grade equivalent. The ages are listed to help assist schools outside North America establish equivalents.

Team Size: A team consists of one, two, or three students.

Computer System: Any computer system or computer language may be used; however, each team may use only one input device (keyboard/terminal). A printer must be available for listing the programs and the sample runs.

Time Limits: Each team has exactly two hours to write five programs and save them to disk or tape. After the two hour period, each team is allowed time to list their programs and sample runs to the printer. No changes in any program are allowed at this time except those changes in the PRINT or INPUT statements that may be necessary to get a hard copy. Fifteen minutes should be plenty of time for this job.

Grading Procedure: It is the responsibility of each local director to arrange for grading of the local contest. Sample solutions will be provided. Each program may be awarded 20 points. These points are broken down as follows:

1. Fifteen points for each program that runs correctly. No partial credit is possible here.
2. If it runs correctly, then 1 to 5 additional points may be given for design and ease of reading. No points are given if the program does not run correctly.

General: No outside help is allowed during the contest, including books, programs, or students not on the team. However, questions concerning the operation of the computer system or terminals, any be answered by those conducting the contest. Any language reference book or pocket guide of commands and statements is also allowed. Time may be taken before the contest to familiarize the contestants with the computer system. Standard programming languages inherent to the processor of the computer should be used.

SCORE CARD

INSTRUCTIONS: Each team should fill out the first two lines of this score card and staple it to each program and sample run that they want to be graded. Use a separate card for each problem.

Division: (Circle one) EL JR SR **Problem No.:**____

Team Name: _____

School: _____

Member Names: _____

(For grader's use only)

Program runs correctly: _____ (15 Points)

Program is well designed: _____ (5 Points)

_____ Total Points

GRADER: _____

----------CUT----------

MASTER SCORE CARD

Instructions: Attach this card to the set of problems from a single team.

Contest Director: _____

Team Name: _____

School: _____

Team Members: _____

Problem Number	Points Awarded
1	
2	
3	
4	
5	

Final Score _____

Number of problems solved _____

Contest, continued...

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CIRCLE 209 ON READER SERVICE CARD

THE UNIVERSITY OF WISCONSIN-PARKSIDE

SECOND ANNUAL

INTERNATIONAL COMPUTER PROBLEM SOLVING CONTEST

April 17, 1982

ELEMENTARY DIVISION

1. LETTER HOME

You are away at summer camp and you have run out on money. You plan to write a letter home to ask for more. Everyone else at camp is in the same situation. Since you are learning how to program a computer, you decide to write a program that will generate a letter that anyone in your situation can use.

The contents of the letter is up to you but it must include certain pieces of information that are supplied by the user of the program. This information is underlined in the following sample letter which you may use.

DEAR MOM AND DAD,

THE $15.00 YOU GAVE ME FOR SPENDING MONEY AT CAMP IS GONE. I SPENT MOST OF IT ON SNACKS. DO YOU THINK YOU COULD SEND AN EXTRA $5.00? THINKING OF YOU OFTEN.

LOVE, KAREN

Write the program that asks for all the underlined information and prints out a letter home. It is not important that your letter look exactly like this one, but it must contain the same information.

2. SECOND THOUGHTS

Write a program that will compute how long a person sleeps at night in seconds. Assume that the person goes to bed between noon and midnight and gets up between midnight and noon. The computer should ask you to enter the time when you go to bed and the time when you wake up: hours, minutes, and seconds as follows:

WHAT TIME DID YOU GO TO BED? (hours, minutes, seconds)
WHAT TIME DID YOU GET UP? (hours, minutes, seconds)

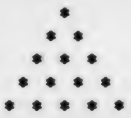
and then compute:

YOU SLEPT FOR XXXXX SECONDS.

Run your program twice: with a bed time of 10,45,32 (h,m,s) and a wake up time of 7,34,47 (h,m,s); and then with a bed time of 2,00,00 and a wake up time of 12,01,01.

3. STAR TRACKS

Write a program that will produce the following design.



The catch is that you must do it using only one * in the program.

4. EGG TOSS

You and your partner decide to enter an egg toss contest. You toss an egg back and forth trying to keep it from breaking. On each toss, the chances that the egg breaks is .2 (20% or 2 out of 10). If you make 6 good tosses before the egg breaks, then you win.

Write a program that simulates the egg toss contest. Run the program until you get a win. Print out wins and losses as follows:

GOOD GOOD GOOD SPLAT!

GOOD GOOD GOOD GOOD GOOD GOOD YOU WIN!

5. WORDS WORTH

The value of a letter in the alphabet (A...Z) is defined as the position of that letter in the alphabet. Thus A=1, B=2, C=3 and so on until finally Z=26. The worth of a word is defined as the sum of the value of each letter in that word. For example, the worth of the word CAB is 6.

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CIRCLE 210 ON READER SERVICE CARD

THE UNIVERSITY OF WISCONSIN-PARKSIDE

SECOND ANNUAL

INTERNATIONAL COMPUTER PROBLEM SOLVING CONTEST

April 17, 1982

JUNIOR DIVISION

1. TRIANGULAR DESIGN

The triangle listed below is generated by following a certain algorithm. Your job is to discover this algorithm and use it to write a program which will generate similar triangles for any number of rows 20.

```
     1
    232
   34543
  4567654
 567898765
67890109876
7890123210987
```

Test your program for rows N=7, and 14.

2. FRACTION SORT

A fraction is the quotient of two integers M/N. A pair of integers 2,3 can be used to represent the fraction 2/3. Suppose the sequence of fractions 1/2, 3/4, 1/3, 23/28, 2/9 appear as ordered pairs in data statements.

```
DATA  1,2
DATA  3,4
DATA  1,3
DATA  23,28
DATA  2,9
DATA  0,0
```

where 0,0 indicates the end of the list.

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CIRCLE 157 ON READER SERVICE CARD

Type in the following program and run it.

```
10    INPUT "ENTER A WORD"; W$
15    PRINT
20    FOR I=1 TO LEN(W$)
30    L$ = MID$(W$,I,1)
40    L  = ASC(L$) - 64
50    PRINT L$,
60    IF L<10 THEN PRINT " ";
70    PRINT L
80    NEXT I
```

Add a few statements to this program to compute the worth of any word and output this number by printing the additional line,

THE WORTH OF THE WORD _____ IS _____

Test your program with the words PRICELESS and WORTHLESS.

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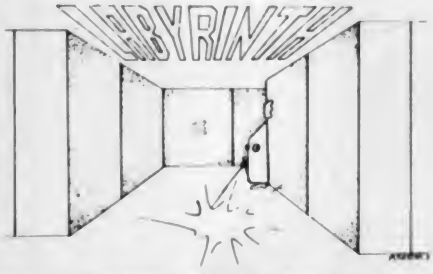

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THE UNIVERSITY OF WISCONSIN

SECOND ANNUAL

INTERNATIONAL COMPUTER PROBLEM SOLVING CONTEST

April 17, 1982

SENIOR DIVISION

1. VERTICAL HISTOGRAM

Write a program to read from DATA statements a collection of strings, and to print a vertical histogram (bar graph) representing the occurrences of each letter of the alphabet (A-Z) in the strings. The string "*END*" terminates the data. Characters other than the letters (A-Z) are to be ignored. You can assume that no lower case letters will appear in the data statements. The following data statements:

```
DATA  "THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG."
DATA  "THIS IS AN EXAMPLE OF HOW"
DATA  "TO TEST YOUR HISTOGRAM PROGRAM.  YOU"
DATA  "CAN USE THIS EXAMPLE."
DATA  "*END*"
```

should produce a vertical histogram in the following format:

```
*       *               *
*       *       *       *               *
*   * * * * * * *     * * * * *   * * * *   * * *
* * * * * * * * * * * * * * * * * * * * * * * * * *
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
```

Test your program with the above data.

2. FIFTEEN

Write a program to input a string of 5 digits (0 through 9) and to find and print all possible combinations of these digits which add to 15. Use the digit 0 to count as 10 in computing the combinations. For example with the input 50154, the output should display the following (perhaps in some other order):

```
50154
-----
50
5 154
 01 4
 0 5

THERE ARE 4 COMBINATIONS TOTALLING 15.
```

Test your program with each of the following inputs: 50154, 78787, 55555, 06528.

3. AUTOMATED INFLATION

Write a program that will read any document and print out a new document where all the dollar amounts have been increased X% where X is a number that is input by the user. The document should be read in from DATA statements one line at a time. Terminate the data statements with DATA "*END*". Test your program for X = 12% and 14%. Be sure to round off all numbers to two decimal places if necessary. For example $123.678 should be rounded up to $123.68.

```
DATA  "BE ADVISED THAT ITEM #1234 COST $12.95 OR 2 FOR $25.00."
DATA  "REMIT TO P.O. BOX 2000.  MINIMUM ORDER IS $100."
DATA  "*END*"
```

Test your program with the above data.

4. TENNIS SET

A tennis game between two players has the following rules:

1. A point can be won by either player.
2. A game is won when one player has won at least four points and leads the opponent by at least two points.
3. A set game is won when one player has won at least six games and leads by at least two games.

You are to simulate the playing of a set of tennis as follows:

The players are labeled 'A' and 'B'. You are asked to enter the probability P (in whole number percent) that A will win any given point. Each game won by player A should be indicated by printing the letter A. If A loses the game, then B wins and the letter B should be printed. The winner of the set is indicated by printing in brackets the letter corresponding to the winner. For example a given set might be indicated by the sequence

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CIRCLE 171 ON READER SERVICE CARD

Write a program that will sort any such sequence of fractions into increasing order and print them out in increasing order. You can assume the numerators and denominators do not exceed 99 and there are less than 100 fractions in any list. The output from the above example should appear as follows:

```
2/9
1/3
1/2
3/4
23/28
```

Run your program using the above data.

3. TENNIS GAME

A tennis game between two players has the following rules:

1. A point can be won by either player.
2. A game is won when one player wins at least four points and leads the opponent by at least two points.

You are to simulate the playing of a game of tennis as follows:

> The players are labeled 'A' and 'B'. You are asked to enter the probability P (in whole number percent) that A will win any given point. Each point won by player A should be indicated by printing the letter A. If A loses the point, then B wins and the letter B should be printed. The winner of the game is indicated by printing in brackets the letter corresponding to the winner. For example, a given game might be indicated by the sequence below where A wins.

ABBABAABAA (A)

Display the results of N games, where N is entered by the user. After displaying the results of the N games you are to display the summary line:

PLAYER A WON _____ GAMES OUT OF _____

Run the program with N=10 and P=55, and with N=10 and P=60.

4. VERTICAL HISTOGRAM

Write a program to read from DATA statements a list of integers in the range of 1 to 9, and to print a vertical histogram (bar graph) representing the occurrences of each number. The list is to be terminated by a zero, and numbers exceeding 9 are to be ignored. For example with the data

```
DATA 1,7,2,9,13,6,7,1,3,7,5,7,9,0
```

the histogram should look like:

```
        *
        *
*       *   *
* * *   * * *   *
1 2 3 4 5 6 7 8 9 .
```

Use the above data to test your program.

5. AUTOMATED INFLATION

Write a program that asks the user to enter a percent from 0 to 100 and that will increase all the numbers that appear in a given document by this percent. The document should be read in from DATA statements using the string "*END*" to terminate data. Here is a sample sentence.

```
DATA  "OLD MACDONALD'S 7 COWS GAVE 120 POUNDS OF MILK TODAY."
DATA  "THEY WILL COME HOME AT 4 P.M."
DATA  "*END*"
```

You are to print out two inflated documents - one with all numbers increased 12% and the other with an increase of 15%. All numbers must be rounded off to two decimal places. (Note that all numbers in the original document can be assumed to be whole numbers.)

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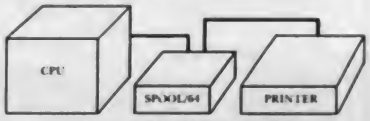

computer, accepts input from parallel centronics cables (serial RS-232 available soon), and its user programming feature allows you to download your own programs so SPOOL/64 can handle sophisticated print routines. And SPOOL/64, used with your software spooler, can give you the highest performance spooling available.

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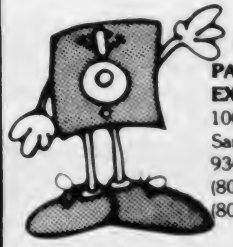

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below where A wins.

ABBABAABAA (A)

You are to display the results of N sets, where N is entered by the user. After displaying the results of the N sets you are to display the summary line:

PLAYER A WON _____ SETS OUT OF _____.

Test your program with N=10, P=55, and again with N=10, P=60.

5. FRACTIONS TO DECIMALS

Write a program that will accept a fraction of the form M/N where M and N are integers (N < 256) and print out the decimal representation indicating those decimals that have repeating sequences of digits by enclosing them in brackets. For example, 1/3 = .3333333.. should appear as .(3) and 41/333 = .123123123.. should appear as .(123).

Format the output as follows:

```
1/3    =  .(3)
22/5   =  4.4
1/7    =  .(142857)
3/8    =  .375
45/56  =  .803(571428)
11/59  =  ?
```

Use the above six fractions for sample runs.

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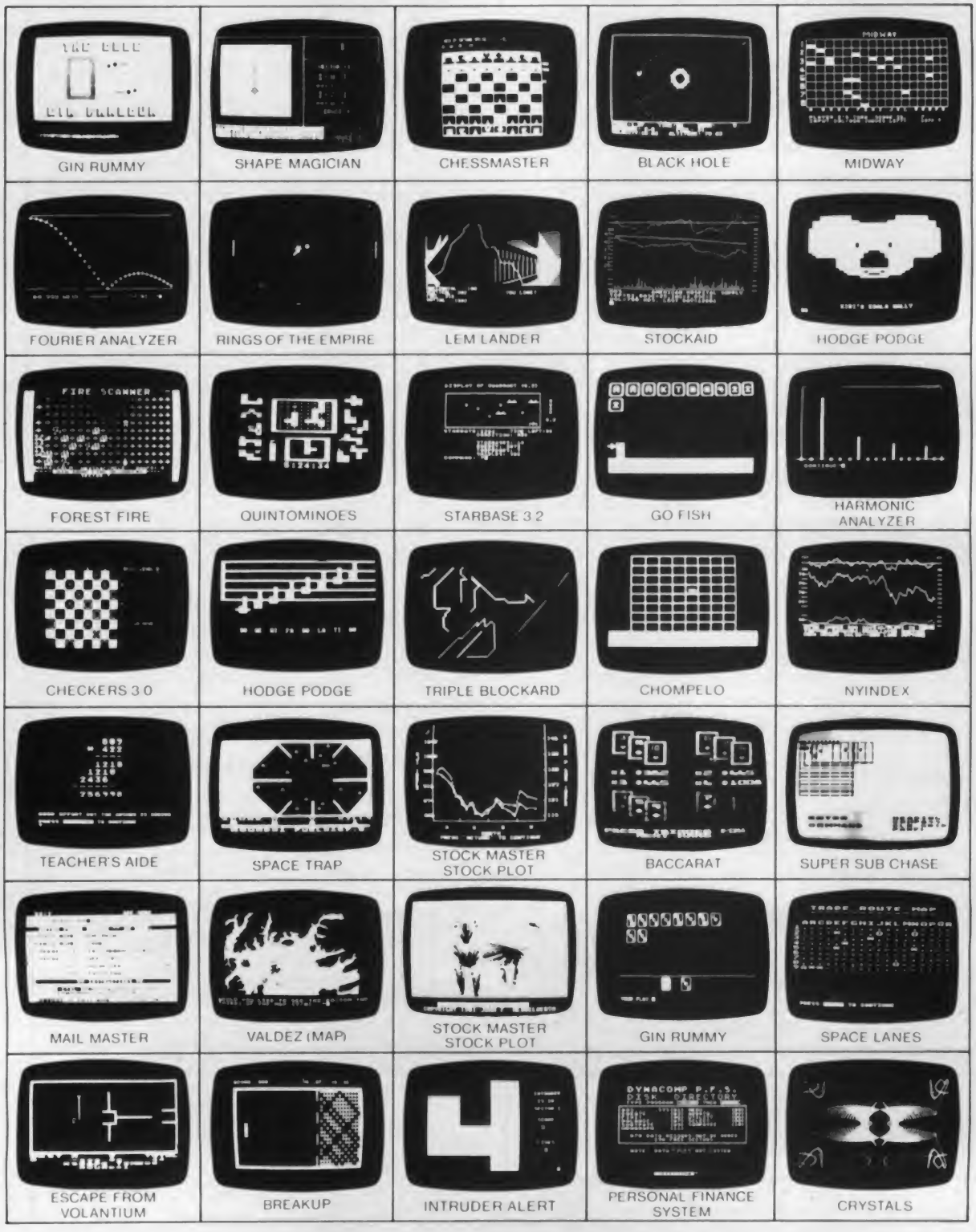

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DYNACOMP'S previous BRIDGE 2.0 customers may upgrade to BRIDGE MASTER for a nominal charge of $5.00 plus postage and handling (see ordering information box). Original cassette/diskette must be returned.

BACCARAT (Atari only) — **Price: $18.95 Cassette/$22.95 Diskette**

This is the European card game which is the favorite of the Monte Carlo jet set. Imagine yourself at the gaming table with 007 to your left and Goldfinger to your right. Learn and play BACCARAT at your leisure on the Atari. Contains full high resolution color graphics and matching sound. Runs in 16K. Requires one joystick.

GIN RUMMY (Apple diskette only) — **Price: $22.95 Diskette**

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POKER PARTY (Available for all computers) — **Price: $19.95 Cassette/$23.95 Diskette**

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GO FISH (Available for all computers) — **Price: $14.95 Cassette/$18.95 Diskette**

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BLACKJACK COACH (32K TRS-80 only) — **Price: $29.95 Cassette/$33.95 Diskette**

BLACKJACK COACH teaches and evaluates professional playing methods. This program will coach you using the Basic and the Complete Card Counting Methods. The BLACKJACK COACH can be used in automatic, unattended play to test the playing and betting strategies you select. Extensive summary reports pinpoint the strengths and weaknesses of various methods of play. All the standard player choices are included: Insurance, splitting pairs, double downs and surrender (optional). A line printer may be used to collect data. If you risk money at the tables, increase your skills with the BLACKJACK COACH!

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FLIGHT SIMULATOR (Available for all computers) — **Price: $19.95/Cassette/$23.95 Diskette**

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VALDEZ (Available for all computers) — **Price: $17.95 Cassette/$21.95 Diskette**

VALDEZ is a computer simulation of supertanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modelled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software reviews in 80 Software Critique, Personal Computing and Creative Computing.

BACKGAMMON 2.0 (Available for all computers) — **Price: $19.95 Cassette/$23.95 Diskette**

This program tests your backgammon skills and will also improve your game. A human can compute against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.

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FOREST FIRE! (Atari only) — **Price: $14.95 Cassette/$18.95 Diskette**

Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalties. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.

CRANSTON MANOR ADVENTURE (North Star, SuperBrain and CP/M only) — **Price: $19.95 Diskette**

At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette.

SPACE EVACUATION! (Available for all computers) — **Price: $15.95 Cassette/$19.95 Diskette**

Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE.

MONARCH (Atari only) — **Price: $14.95 Cassette/$18.95 Diskette**

MONARCH is a fascinating economic simulation requiring you to survive on 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much land to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy. Runs in 16K Atari.

NEW

RUBIK'S CUBE SOLVER (Available for all computers) — **Price: $14.95 Cassette/$18.95 Diskette/$21.45 Disk**

Solving the Rubik's cube puzzle is an exercise in algorithmic logic, and is a "natural" for computer calculation. The RUBIK'S CUBE SOLVER permits you to input the starting state of the 24 facing elements of the cube. It then solves the problem one step at a time, with each step shown as a unfolded view of the cube. Can you solve the cube in fewer steps. In any case, it sure beats disassembling the cube or peeling off and replacing the colors! Requires 16K.

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II), NEC and Apple (Applesoft) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible format) 8" CP/M floppy disks for systems running under MBASIC or CBASIC (for example, Altos, Xerox 820, Heath/Zenith and many others). 5¼" CP/M diskettes are available for the North Star, SuperBrain and Osborne computer systems.

*ATARI, PET/CBM, NORTH STAR, CP/M, IBM, OSBORNE, SUPERBRAIN, NEC PC-8000 and XEROX are registered trademarks and/or trademarks.

**Except where noted, all TRS-80 Model I software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER, TRS-80 diskettes are not supplied with either DOS or BASIC.

***For most North Star disk-based systems.

****For Altair systems having Microsoft BASIC.

*****For SUPERBRAIN systems running under MBASIC or CBASIC (state which).

DYNACOMP OFFERS THE FOLLOWING

- Widest variety
- Guaranteed quality
- Fastest delivery
- Friendly service
- Free catalog*
- Toll free order phone

*$2.00 U.S. funds for foreign mailing

AND MORE...

NEW

STARBASE 3.2 (Available for all computers) — **Price: $13.95 Cassette/$17.95 Diskette**

This is the classic space simulation, but with several new features. For example, the Croylins now shoot at the Invincible without warning while also attacking starbases in other quadrants. The Croylins also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Invincible is besieged by three heavy cruisers and a starbase S.O.S. is received! The Croylins get even! See the software reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.

LIL' MEN FROM MARS (Atari only) — **Price: $19.95 Cassette/$23.95 Diskette**

Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.

ALVIN (Atari only) — **Price: $17.95 Cassette/$21.95 Diskette**

ALVIN is a great arcade game. You are commanding a highly maneuverable ship seeking to destroy several enemy cities. You are attempting to bomb these cities while at the same time trying to avoid their defensive fire (MISSILE COMMAND" in reverse?). Also, your radar has been damaged so that you can only see downwards. This would normally not be much of a problem except that you also have to contend with high-flying enemy aircraft. As long as you are above these aircraft you have the advantage and are safe. However, high level bombing takes considerable skill. Therefore to achieve your goal the best strategy is to swoop down for a bombing run while the enemy craft is out of range, and quickly retreat to the skies. A fun game. Requires 16K.

ESCAPE FROM VOLANTIUM (Atari only) — **Price: $15.95 Cassette/$19.95 Diskette**

Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTIUM! To escape you must maneuver your space ship around obstacles and laser blast the guardian (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new guardian appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and guardians appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.

ALPHA FIGHTER (Atari only) — **Price: $13.95 Cassette/$17.95 Diskette**

Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.

THE RINGS OF THE EMPIRE (Atari only) — **Price: $14.95 Cassette/$18.95 Diskette**

The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.

INTRUDER ALERT (Atari only) — **Price: $15.95 Cassette/$19.95 Diskette**

This is a fast paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.

MIDWAY (Atari 32K only) — **Price: $14.95 Cassette/$18.95 Diskette**

MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.

NEW

GOLF PRO (Atari only) — **Price: $17.95 Cassette/$21.95 Diskette**

Both realism and beautiful graphics are joined together in GOLF PRO to produce the best golf simulation available. To really appreciate this game, you should have a color TV so that you can see the green of the fairway, the blue of the water hazards, and the white sand of the traps. You tee off with a wood, use your wedge in the sand trap, and putt on the green just as would be done on the course. Show off the Atari to your friends with GOLF PRO. Requires 16K and one joystick.

GAMES PACK I (Available for all computers) — **Price: $14.95 Cassette/$18.95 Diskette**

GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSERACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.

GAMES PACK II (Available for all computers) — **Price: $14.95 Cassette/$18.95 Diskette**

GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY-DUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.
Why pay $9.95 or more per program when you can buy a DYNACOMP collection for just $14.95?

MOON PROBE (Available for all computers) — **Price: $12.95 Cassette/$16.95 Diskette**

This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle. Runs in 16K Atari.

SPACE TRAP (Atari only, 16K) — **Price: $14.95 Cassette/$18.95 Diskette**

This galactic "shoot 'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.

SUPER SUB CHASE (Atari only) — **Price: $19.95 Cassette/$23.95 Diskette**

SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.

TWO PLAYER GAMES

NEW

TWO PLAYER GAMES (Available for all computers; 32K disk/diskette only)

DYNACOMP has acquired the distribution rights to the best eight of Ximon's war games. These two-player games were originally written for the North Star computer, but have since been converted to play on all of the computers currently supported by DYNACOMP. Because our licensing and development costs were so low, DYNACOMP offers these programs two to a disk(ette) for only $19.95/diskette, $23.95/disk. If you like war games, then this is a bargain you can not pass up.

Set #1: **PANZER and BLITZKRIEG**

PANZER
Date: 23 Nov. 1943 Place: Several miles west of Kiev, Russia. The Russians have just liberated Kiev and are moving quickly to reach the German forces which are preparing for a last desperate attempt to halt the Russian advance.

BLITZKRIEG
Date: Spring 1940 Place: Northern France. The German blitzkrieg in the east was complete. Germany had turned its attention to the west: France. The German forces has penetrated the Ardennes and Meuse. The heroism of Dunkirk, the defense of the Somme position, and the final collapse of the French armies in the south has all passed. And, now, the drive on Paris . . .

Set #2: **STARSHIP TROOPERS and INVASION OF THE MUD PEOPLE**

STARSHIP TROOPERS
Date: Fortieth Century Place: Arachoid planet of Sheol. The first all-out battle on the planet Sheol which will match equal forces of Terran and alien units. The outcome will set the course of the conflict, for the planet of Sheol is a key position in the solar war.

INVASION OF THE MUD PEOPLE
A Peruvian army battalion has been dispatched to a remote village area to investigate the destruction of many local dwellings and the disappearance of most of the villagers. Eye-witnesses have reported strange creatures appearing from scores of slimy mud holes which have oddly begun forming across the terrain.

Set #3: **FALL OF THE THIRD REICH and ARMORCAR**

FALL OF THE THIRD REICH
Date: March, 1945 Place: Remagen, Germany. The allies under General Eisenhower had reached the Rhine. The Germans had failed in destroying the Ludendorff railroad bridge, allowing several allied divisions to cross before it finally collapsed on March 17 .. and so, the allies began their drive on Berlin.

ARMORCAR
Date: 2 Feb. 1944 Place: Minsk, Russia. A German front-line unit is hard pressed for radio equipment and medical supplies. A relief convoy of armored cars must reach them through partisan-infested territory.

Set #4: **MOUNT SURIBACHI and MIDDLE EARTH**

MOUNT SURIBACHI
Date: 16 Feb. 1945 Place: Iwo Jima. The Japanese opened fire from Mount Suribachi as the marines landed on the pork-chop-shaped island. Cooped from the hill could cover the entire island, thus it was a critical objective if the Americans were to capture and utilize the all-important air field. Mount Suribachi proved to be one of the most strongly defended positions in the Japanese theatre of war.

MIDDLE EARTH
Date: 1997 Place: MIDDLE EARTH. Through a maze of tunnels, crevices, and rocky passageways discovered leading from an inactive volcano in South America, a team of United Nations' researchers have undertaken a mission to an uncharted frontier: the center of the Earth. After a perilous journey spanning a period of several months, the mission has arrived at the Earth's core, a land of flames, steam, oceans, and unforeseen vegetation. And then the creatures of MIDDLE EARTH appeared . . . unmatched by the most frightening horror stories created by man . . .

MISCELLANEOUS

CRYSTALS (Atari only) — **Price: $14.95 Cassette/$18.95 Diskette**

A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari. Runs in 16K.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY

DYNACOMP now distributes the 23 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.
Price: $9.95 each/$8.95 each (4 or more)
The complete collection may be purchased for $159.95.

NEW

5¼" DISKETTES (soft sectored/ten sectored) — **Price: $39.95/20 Diskettes**

As you might imagine, DYNACOMP purchases diskettes in large quantities and at wholesale prices. We want to pass the savings along to you!

BUSINESS and UTILITIES

NEW

PORTFOLIO MANAGEMENT (Apple only) — **Price: $69.95 two Diskettes**

The PORTFOLIO MANAGEMENT package was written by a stock broker to help manage portfolios for individual customers. With this program data files can be easily created and kept up to date. A variety of reports can be generated for clients which are attractively and professionally laid out. The user may define his/her own investment categories. PORTFOLIO MANAGEMENT is a top quality, professional tool which will not only provide you with new conveniences but will also serve to enhance your appearance as an efficient and up to date advisor to your clients. Comes complete on two diskettes along with a 30 page instruction manual.

NEW

PERSONAL FINANCE SYSTEM (Available for all computers) — **Price: $39.95 Diskette**

PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and tax deductible items, PFS will sort and summarize expenses by payee, and display information on expenditures by any of 26 user defined codes by month or by payee. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimum memory (24K Atari, 32K North Star) and will store up to 600 records per disk (and over 1000 records per disk by making a few simple changes to the programs). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate guesswork and tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

NEW

FAMILY BUDGET (Apple and Atari only) — **Price: $34.95 Diskette**

FAMILY BUDGET is a very convenient financial record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and tax deductible income. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to 5 payroll and tax accounts. Data are easily retrieved giving the user complete control over an otherwise complicated (and unorganized!) subject.

NEW

TEXT MASTER (Apple 32K, diskette only) — **Price: $49.95 Diskette**

TEXT MASTER is a general purpose text editor for the Apple II computer. It features powerful, English-oriented commands which permit the complete manipulation of textural information. The information treated may be correspondence, computer programs, data to be used by other programs, and more. TEXT MASTER also interfaces with any printer connected to your Apple. The minimum system requirements are 32K of RAM, Applesoft on ROM, at least one disk, and a lower case adapter. TEXT MASTER can process any length file segment by segment. Thus it is possible to process files as large as a diskette. Comes complete with an efficient 16 page manual. TEXT MASTER is equivalent in capability to many word processing systems costing 3 x or more in price. The commands available in TEXT MASTER are: COLLECT, USE, EXECUTE, NONUM, INSERT, MERGE, STOP, RENUM, DELETE, SAVE, COPY, FREE, REPLACE, WAIT, MOVE, LENGTH, LIST, RESAVE, CLEAR, AUTO, RETRY, APPEND, SET, MANUAL, CHANGE, SCRATCH, SHOW, CATALOG, MODIFY, COMPARE, NUM, DISPLAY, HELP.

INTELINK (Atari only) — **Price: $49.95 Diskette**

This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., The SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the complete contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the supplied text editor and later "uploaded" to another computer, making the Atari a very smart terminal. Even Atari BASIC programs may be uploaded. Further, a command file may be built off-line and used later as controlling input for a time-share system. That is, you can set up your sequence of time-share commands and programs, and the Atari will transmit them as needed, batch processing. All this adds up to saving both connect time and your time.

NEW

PAYFIVE (Apple II plus diskette, two drives required) — **Price: $149.95**

This is an enormously flexible employee payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and completes the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes many other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for $30, and that payment later applied to the software purchase.

SHOPPING LIST (Atari only) — **Price: $12.95 Cassette/$16.95 Diskette**

SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

NEW

TAX OPTIMIZER (Available for all computers) — **Price: $59.95 Diskette**

The TAX OPTIMIZER is an easy-to-use, menu-motivated software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files. TAX OPTIMIZER is tax deductible!

STOCK MASTER/STOCK PLOT (Apple 48K) — **Price: $59.95 Diskette**

This is a full-featured stock portfolio management and analysis system. Ten years of records on up to thirty stocks may be maintained. You may record prices, revenue, earnings/share, ROE, quarterly earnings and dividends, transactions, long/short term gains, P/E, indexes (DJ, S & P, NASDAQ) and MORE! You may plot (HIRES) the price history of any stock against any other, time, or the indexes. Portfolio value may be evaluated at any time. Comes complete with superbly written instructions and sample files on a second diskette.

TURNKEY AND MENU (Atari only) — **Price: $17.95 Diskette**

TURNKEY is a utility program which allows you to create autoboot, autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU. MENU lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

STOCKAID (Atari only) — **Price: $29.95 Diskette**

STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 239 days x 16 stocks. Included are stock dividend and split adjustment capabilities. A very professional package!

NEW

NYINDEX (Atari only) — **Price: $29.95 Diskette**

NYINDEX is a comprehensive software package for storing, retrieving and plotting New York Stock Exchange information. The daily data treated includes the composite index, advances, declines, new highs and new lows. Graphical displays include the above plus the index oscillator, cumulative advances/declines and moving averages. Data entry and editing is easy. The diskette includes more than two years of daily data. NYINDEX is an excellent companion to STOCKAID.

PLAYER-MISSILE GRAPHICS TABLET (Atari only) — **Price: $19.95 Diskette**

The PLAYER-MISSILE GRAPHICS TABLET was designed to take the drudgery out of developing four color displays in GRAPHICS MODE 7. No longer will you have to read the locations of those tiny blocks on your graph paper and calculate PLOTs and DRAWTOs. With PMG you will be able to easily design colorful graphic displays with your joystick and save them on diskette for later recall.

LIFE CYCLE ANALYSIS AND DEPRECIATION (Apple diskette only) — **Price: $39.95 Diskette**

This software package creates a data file of business expenses for equipment which can later be used to calculate and display a variety of reports. You may project annual costs, find the present worth, create depreciation schedules and justify tax deductions. The computer-to-hardcopy reports conform to standards set by federal agencies. This is an invaluable package for any businessman who has invested in equipment. LIFE CYCLE ANALYSIS features an easy to use data file creation section and provides formatted hardcopy reports for use in presentations or for tax record keeping purposes. When used for generating tax information, this package is tax deductible! Requires 48K. Comes on two diskettes.

NEW

MICROMAGIC (Apple diskette only) — **Price: $39.95 Diskette**

The emphasis of this program is clearly the MAGIC! MICROMAGIC offers outstanding versatility in its ability to function as a stand alone entertainment package or as a utility program to create stunning animated graphics for use in other programs. The secret lies in MICROMAGIC's special on screen graphics editor. You control a graphics cursor directly from the keyboard, creating high resolution images using all 16 available colors. When you are done with a picture, it can be saved on disk with a single key command. Up to 24 images can be saved as "frames" of a movie, and then played back at high speed to creat short animated sequences. The effects are truly stunning.

This package comes complete with demonstration programs so that even novice users can get immediate results. No programming skills are necessary to use MICROMAGIC. If you have been frustrated by the effort required to create graphics images with your computer, MICROMAGIC will delight you.

SHAPE MAGICIAN (Apple II, 48K, diskette only) — **Price: $29.95**

At last! An utility for painlessly creating graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or Master Card, include all numbers on card. Purchase orders accepted.

Shipping and Handling Charges
Within North America: Add $2.00
Outside North America: Add 15% (Air Mail)

Delivery
All orders (excluding books) are sent First Class.

Quantity Discounts
Deduct 10% when ordering 3 or more programs; 20% when ordering 5 or more. Dealer discount schedules available upon request.

8" CP/M Disks
Add $2.50 to the listed diskette price for each 8" floppy disk (IBM soft sectored CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5¼" CP/M Disks
All software available on 8" CP/M disks is also available on 5¼" disks, North Star, Osborne, Superbrain and NEC format.

Ask for DYNACOMP programs at your local software dealer. Write for detailed descriptions of these and other programs from DYNACOMP.

DYNACOMP, Inc. (Dept. C)
1427 Monroe Avenue
Rochester, New York 14618
24 hour message and order phone: (716) 442-8731
Toll free order phones: (800) 828-6772
(800) 828-6773
Office phone (9AM-5PM EST): (716) 442-8960
New York State residents please add 7% NYS sales tax.

EDUCATION

HODGE PODGE (Apple 48K only) — **Price: $14.95 Cassette/$18.95 Diskette**

Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1½ to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORLD and SOFTALK.

TEACHER'S AIDE (Atari and PET only) — **Price: $13.95 Cassette/$17.95 Diskette**

TEACHER'S AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiple arithmetic problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems, one particularly nice feature of the division module is that the long hand division steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers) — **Price: $39.95 Cassette/$43.95 Diskette**

DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

DATA SMOOTHER (Not available for Atari) — **Price: $19.95 Cassette/$23.95 Diskette**

This special data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculations. Also included is automatic plotting of the input data and smoothed results.

FOURIER ANALYZER (Available for all computers) — **Price: $19.95 Cassette/$23.95 Diskette**

Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFA (Transfer Function Analyzer) — **Price: $19.95/$23.95 Diskette**

This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log-frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers) — **Price: $24.95 Cassette/$28.95 Diskette**

HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique feature is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of $81.95 (three cassettes) and $63.95 (three diskettes).

REGRESSION I (Available for all computers) — **Price: $19.95 Cassette/$23.95 Diskette**

REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option; an extensive internal library of fitting functions; data editing, automatic data, curve and residual plotting; a statistical analysis (e.g.: standard deviation, correlation, coefficient, etc.) and much more. In addition, new fits may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

REGRESSION II (Available for all computers) — **Price: $19.95 Cassette/$23.95 Diskette**

PARAFIT is designed to handle those cases in which the parameters a imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A(1), A(2), etc.) as one or more BASIC statement lines. Data, results and residuals may be manipulated and plotted as with REGRESSION I. Use REGRESSION I for polynomial fitting, and PARAFIT for those complicated functions.

MULTILINEAR REGRESSION (MLR) (Available for all computers) — **Price: $24.95 Cassette/$28.95 Diskette**

MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for $51.95 (three cassettes) or $63.95 (three diskettes).

ANOVA (Not available on Atari cassette or for PET/CBM) — **Price: $39.95 Cassette/$43.95 Diskette**

In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2^N factorial design. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion (by a professor in the subject) and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

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DYNACOMP is the exclusive distributor for the software keyed to the popular texts *BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2* by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

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See reviews in KILOBAUD, Dr. Dobbs, and ACCESS.

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NEW

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BEAM DEFLECTION is the first in DYNACOMP's new series of structural analysis software packages. It consists of two programs. The first program permits the development of data files which describe the problem. For example, the ends of the beam may be pinned, clamped or free. The beam may be uniformly supported by an elastic bed, or held up by springs variously placed and having differing spring constants. The elasticity and cross section of the beam may vary along its length. The load may be uniformly distributed or it may include discrete forces. The beam may be pinned at various points along its length. And so on. All this information may be easily entered and edited using the data input program.

Following this the analysis program is called. The calculated results are the stress and deflections of the beam, both in numerical and graphical form, since the input data is saved, cases may be easily re-run with modification, thereby permitting iterative design.

The documentation which comes with BEAM DEFLECTION clearly shows how to use the software. In addition, three test problems are described and demonstrated to ensure that you understand how to use the program. Also, helpful theoretical information is supplied in the appendix.

STATTEST (Not available on Atari cassette or for PET/CBM) — **Price: $19.95 Cassette/$23.95 Diskette**

This is a statistical reference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear correlation and regression. This menu-directed statistical workhorse is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

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DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

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A Modular Data Base for the Apple

Mark Pelczarski

The single application for which computers are most used is storage and retrieval of information. The type of program that accomplishes this task is a data base program. A data base program can turn a computer into an electronic filing system through which almost any kind of data can be stored for further reference, then retrieved in a variety of ways.

The following program is an Apple data base that can handle thousands of pieces of information in each "file" that you create. A RAM-based version of this program (one that holds all the data in memory, rather than on disk) appeared in a series called "The Developing Data Base" in *SoftSide* magazine last year. This version, which uses random access disk files, is significantly different, however, and those who typed in the previous version will probably find it easiest to start anew.

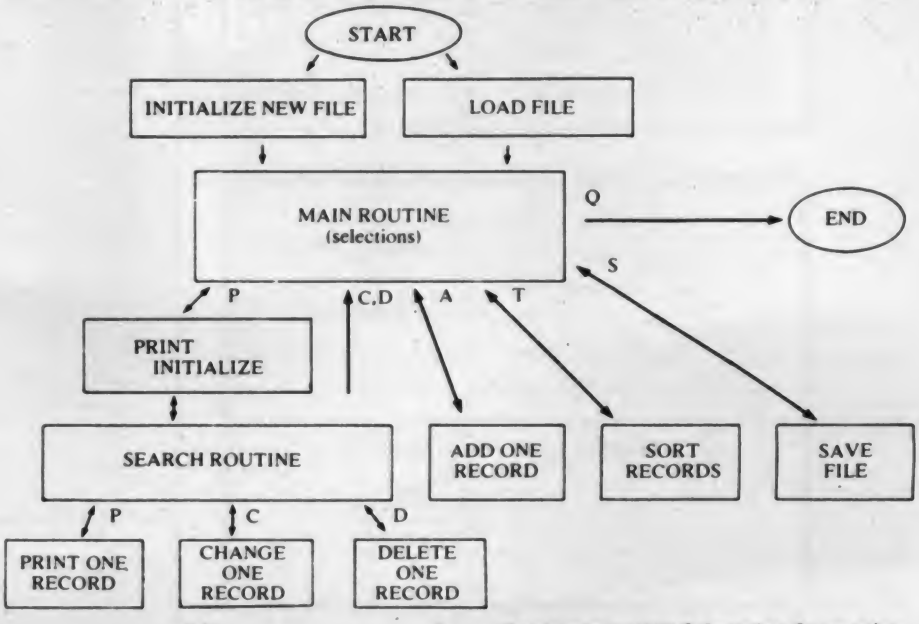
Structurally, the program begins with a main routine (lines 10 through 600) that lists the available options. Each option has a corresponding subroutine, which is a module separate from any other part of the program. (See Figure 1 for the actual organization.) These modules can be easily changed or replaced with little concern about affecting other modules of the program. This makes it easy to update or customize the program.

Mark Pelczarski, 1206 Kings Circle, West Chicago, IL 60185.

Data Storage

The actual organization of information can be pictured as a table with rows and columns. Each row is a record. (Using a mailing list as an example, one record would be one person's name, address, city, state, and zip code.) Each column in the table has a heading under which there is information for each record. (The headings in the mailing list example would be Name, Address, City, State, and Zip.) To allow the most efficient use of memory, the items in only one of the columns are

Figure 1. Subroutine Organization.



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stored in RAM at any time. When a particular record is needed, the remainder of the information is pulled from disk.

To make it possible to pull any given record from disk at any time, a random access disk file is used. A sequential file only allows you to read or write items in sequence (if you wanted the tenth record you would first have to read records one through nine). A random access file allows you to specify what number record you want, and the computer automatically calculates an offset and gets only the information needed. To allow calculation of the offset, however, each record must be identical in size.

To avoid shuffling information around on the disk (when sorting a file, for example) one other set of information will be kept in RAM. I$ is the array consisting of items under one of the headings; P% will be a corresponding array containing the number of each record as it appears on disk. In other words the first record in sequence in RAM, after sorting or whatever, may be the 16th on the disk. P%(1) would then contain the number 16.

There are a few other observations I should make on storage. To conserve space, the zero element in each array has been used. Thus, heading 1 is stored in H$(0), where H$ is the array that holds the heading names. Likewise, the first item is in I$(0), which means in our example above that it is actually P%(0) that would contain the number 16.

TI$ is an array containing one record as it is being processed in RAM. When a record is sent to disk, it is sent from TI$. Likewise, when one is read from disk it is put in TI$.

NI and NH are the number of items (records) and number of headings, respectively, except that the value of each is one less than the actual value since zero is counted. (Example: if there are eight headings, NH is 7, covering headings 0 through 7). CH contains the number of the current heading for which the items

```
1160 IF NI=-1 THEN 1180
1170 FOR I=0 TO NI:
       INPUT P%(I):
     NEXT
1180 PRINT D$;"CLOSE";F$+".HDG"
1190 PRINT D$;"OPEN";F$+".DAT,L";B%(NH+1)
1200 IF NI=-1 THEN 1220
1210 GOSUB 1300
1220 SS=1: RETURN
1230 PRINT "FILE NOT FOUND": GET A$: POKE 216,0: GOTO 110
1299 REM READ ITEMS UNDER HEADING CH
1300 PRINT:
     FOR I=0 TO NI
1310   PRINT D$;"READ";F$+".DAT,R";P%(I);",B";B%(CH)
1320   INPUT I$(I)
1330 NEXT
1340 PRINT D$: RETURN
1499 REM INITIALIZE SUBROUTINE VERS. 1
1500 INPUT "GIVE YOUR FILE A NAME : ";F$
 10 REMTHE DEVELOPING DATA BASE
 20 REM    COPYRIGHT 1981,                MARK PELCZARSKI
100 D$=CHR$(4): REM CONTROL-D
105 DIM C$(7),C1%(7),C2%(7),F$(5): CH=0
110 HOME: PRINT "(I) INITIALIZE A NEW DATA SET"
120 PRINT "(L) LOAD A PREVIOUSLY SAVED DATA SET ?";
130 GET A$: PRINT A$
140 IF A$="L" THEN
      GOSUB 1000: GOTO 200
150 IF A$="I" THEN
      GOSUB 1500: GOTO 200
160 GOTO 130
200 POKE 216,0: HOME: PRINT "(S) SAVE CURRENT DATA"
220 PRINT "(P) PRINT DATA"
230 PRINT "(A) ADD DATA"
240 PRINT "(C) CHANGE A RECORD"
250 PRINT "(D) DELETE A RECORD"
260 PRINT "(T) SORT"
270 PRINT "(F) FILE NAMES"
280 PRINT "(N) NEW DATA FILE"
290 PRINT "(Q) QUIT"
295 PRINT: PRINT NI+1;" RECORDS, ROOM FOR ";MX-NI-1;" MORE"
300 GET A$: PRINT A$: PRINT
320 IF A$="S" THEN
      GOSUB 2000: GOTO 200
330 IF A$="P" THEN
      GOSUB 3000: GOTO 200
340 IF A$="A" THEN
      GOSUB 4000: GOTO 200
350 IF A$="C" THEN
      SB=3: GOSUB 8000: GOTO 200
360 IF A$="D" THEN
      SB=4: FS=1: GOSUB 8000: GOTO 200
370 IF A$="T" THEN
      GOSUB 7000: GOTO 200
380 IF A$="F" THEN
      GOSUB 600: GOTO 200
400 IF A$="Q" OR A$="N" THEN 500
410 GOTO 200
500 IF SS=1 THEN 530
520 GOSUB 2000
530 PRINT D$;"CLOSE";F$+".DAT"
540 IF A$="N" THEN
      CLEAR: GOTO 100
550 END
600 PRINT D$;"CATALOG": GET A$: RETURN
999 REM LOAD SUBROUTINE VERS. 1
1000 INPUT "FILE NAME? ";F$
1010 ONERR GOTO 1230
1020 PRINT D$;"OPEN";F$;".HDG"
1030 PRINT D$;"READ";F$+".HDG"
1040 INPUT NH,NI,MX,LK
1130 DIM H$(NH),B%(NH+1),I$(MX),P%(MX),TI$(NH)
1140 FOR I=0 TO NH:
       INPUT H$(I),B%(I):
     NEXT
1150 INPUT B%(NH+1)
```


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are stored in RAM.

Lastly, B% is an array that reflects the length allowed for each heading. The actual values in B% tell which byte is the first in the record for each heading. This way it is possible not only to specify which record is to be read, but also to specify which item in that record is desired. The Apple statement that lets you read an item for record 11, for example, starting at byte 15 of that record is:

PRINT D$;"READ filename,R11,B15"

where D$ is set equal to Control-D.

An added value of using B% to show the beginning of each item is that the information under various headings can be of different lengths. The zip code, for example, can have fewer characters allotted than the name, saving storage space.

Loading or Initializing

The first routine you enter upon running the program is either the initialize routine (1500), which allows you to start a new file, or the load routine (1000), which loads data from a previously saved file. To initialize a file, a name and number of headings is specified, followed by the name of each heading and the maximum length for the items under it. This information is saved in a separate disk file under a name you give with ".HDG" appended to it. (The computer automatically adds ".HDG".) This heading file also contains the byte information from B%, and is read and modified each time the data base is used.

Loading a previously saved file requires loading all the information from file "name.HDG," then loading I$ with the items from the first heading from file "name.DAT," which holds the actual data. An extra little subroutine is used to load the items from heading CH (which initially equals zero), because that function will be needed later in a few places. That routine starts at line 1300.

Adding, Saving, and Printing

After you create a file, the first thing you will want to do is add some data to it. Choosing "A" from the menu allows you to add a record through the add subroutine (4000). To add a record, enter information for each of the headings. The add subroutine shares a small subroutine at line 4500, which allows a single item to be input. After the information is entered, that record is put on disk with a GOSUB to 1800, another multi-used subroutine that saves TI$ to record R on disk. A few lines in the add routine use a variable LK. This will be explained later when we talk about deleting records.

Once information is in the data base,

```
1510 IF F$="" THEN 1500
1520 INPUT "HOW MANY HEADINGS? ";NH
1530 IF NH<1 THEN 1520
1540 NH=NH-1: NI=-1: LK=-1
1560 DIM H$(NH),B%(NH+1),TI$(NH): B%(0)=0
1570 FOR I=0 TO NH
1580   PRINT "HEADING #";I+1;: INPUT " : ";H$(I)
1590   INPUT "MAXIMUM LENGTH : ";J
1600   B%(I+1)=B%(I)+J+1
1610 NEXT I
1620 INPUT "WHICH HEADING IS THE LONGEST ON WHICH   YOU WILL SORT? ";J:
     J=J-1: IF J<0 OR J>NH THEN 1620
1630 J=B%(J+1)-B%(J)-1: MX=INT((FRE(0)-2000)/(J+2))
1640 DIM I$(MX),P%(MX)
1650 PRINT D$;"OPEN";F$+".DAT,L";B%(NH+1)
1660 SS=0: RETURN
1699 REM READ RECORD I INTO TI$
1700 PRINT: R=P%(I)
1710 FOR J1=0 TO NH
1720   PRINT D$;"READ";F$+".DAT,R";R;",B";B%(J1)
1730   INPUT TI$(J1)
1740 NEXT
1750 PRINT D$: RETURN
1799 REM WRITE RECORD R FROM T$
1800 PRINT:
     FOR J1=0 TO NH
1810   PRINT D$;"WRITE";F$+".DAT,R";R;",B";B%(J1)
1820   PRINT TI$(J1)
1830 NEXT
1840 PRINT D$: RETURN
1999 REM WRITE SUBROUTINE VERS. 1
2000 PRINT: ONERR GOTO 2290
2010 PRINT D$;"OPEN";F$+".HDG"
2020 PRINT D$;"WRITE";F$+".HDG"
2030 PRINT NH: PRINT NI: PRINT MX: PRINT LK
2040 FOR I=0 TO NH:
       PRINT H$(I): PRINT B%(I):
     NEXT
2050 PRINT B%(NH+1)
2060 IF NI=-1 THEN 2270
2070 FOR I=0 TO NI:
       PRINT P%(I):
     NEXT
2270 PRINT D$;"CLOSE";F$+".HDG"
2280 SS=1: RETURN
2290 PRINT "DISK ERROR": GET A$: GOTO 200
2999 REMPRINT SUBROUTINE VERS. 4
3000 IF NI=-1 THEN
       GOSUB 9000: RETURN
3005 PRINT "(S) SELECT FORMAT, OR (D) DEFAULT";: GET A$: PRINT
3006 IF A$="S" THEN
       GOSUB 10000: FS=2: GOTO 3010
3007 IF A$<>"D" THEN 3005
3008 FS=1
3010 PRINT "(S) SCREEN, OR (P) PRINTER";: GET A$: PRINT
3020 IF A$="P" THEN
       SB=2: GOTO 3050
3030 IF A$<>"S" THEN 3010
3040 SB=1: PRINT: PRINT "AFTER EACH RECORD <ESC> WILL RETURN TO": PRINT
     "THE MENU, ANY OTHER KEY CONTINUES."
3050 PRINT "<PRESS ANY KEY>": GET A$: GOSUB 8010
3100 RETURN
3299 REMPRINT ONE RECORD
3300 IF SB=2 THEN
       PRINT D$;"PR#1"
3310 ON FS GOSUB 3700,3800
3320 IF SB=2 THEN
       PRINT D$;"PR#0": GOTO 3350
3340 IF SB<>4 THEN
       GET A$:
       IF A$=CHR$(27) THEN
         RS=1
3350 RETURN
3699 REM PRINT ONE DEFAULT V. 1
3700 PRINT: PRINT "RECORD ";I+1: PRINT
3710 FOR J=0 TO NH
3720   PRINT H$(J),TI$(J)
3730 NEXT J
3740 RETURN
3799 REM PRINT ONE FORMAT V. 1
3800 J=1: T=0: B$=""
3820 J1=VAL(MID$(F$(T),J,1)): J=J+1
3830 IF J1<5 THEN
       N=VAL(MID$(F$(T),J,2)): J=J+2
3840 ON J1 GOTO 3850,3860,3870,3890,3910,3970
3850 A$=H$(N): GOTO 3950
3860 A$=TI$(N): GOTO 3950
3870 B$=LEFT$(B$,N-1):
     IF LEN(B$)<N-1 THEN
```

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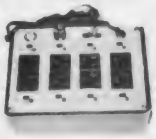

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Data Base, continued...

```
      FOR J2=LEN(B$) TO N-2:
        B$=B$+" ":
      NEXT
3880 GOTO 3960
3890 PRINT B$:
     IF N>1 THEN
       FOR J2=2 TO N:
         PRINT:
       NEXT
3900 B$="": GOTO 3960
3910 IF J>LEN(F$(T)) THEN
       T=T+1: J=1
3920 J2=J
3930 IF MID$(F$(T),J2,1)<>"!" THEN
       J2=J2+1: GOTO 3930
3940 A$=MID$(F$(T),J,J2-J): J=J2+1
3950 B$=B$+A$
3960 IF J>LEN(F$(T)) THEN
       T=T+1: J=1
3965 GOTO 3820
3970 PRINT B$: RETURN
3999 REM ADD SUBROUTINE VERS. 2
4000 SS=0: NI=NI+1
4005 PRINT: PRINT "RECORD ";NI+1: PRINT
4010 FOR J=0 TO NH
4020   GOSUB 4500
4030 NEXT J
4040 IF LK=-1 THEN
       R=NI: GOTO 4080
4050 R=LK
4060 PRINT D$;"READ";F$+".DAT,R";R
4070 INPUT LK: PRINT D$
4080 GOSUB 1800: P%(NI)=R: I$(NI)=TI$(CH)
4090 RETURN
4499 REM INPUT AN ITEM
4500 T=B%(J+1)-B%(J)-1
4510 PRINT H$(J);: INPUT " : ";TI$(J)
4540 IF LEN(TI$(J))>T THEN
       TI$(J)=LEFT$(TI$(J),T)
4550 RETURN
4999 REM CHANGE SUBROUTINE VERS. 2
5000 PRINT: PRINT "(C) CHANGE ITEM, (K) KEEP ITEM, OR": PRINT
     "(R) KEEP REMAINDER OF RECORD"
5030 PRINT: PRINT "RECORD ";I+1
5040 CS=1: RS=0:
     FOR J=0 TO NH
5050   PRINT: PRINT H$(J);" : ";TI$(J);"  ";
5055   IF RS=1 THEN
         PRINT: GOTO 5090
5060   GET A$:
       IF A$<>"C" AND A$<>"K" AND A$<>"R" THEN 5060
5070   PRINT A$:
       IF A$="K" THEN 5090
5075   IF A$="R" THEN
         RS=1: GOTO 5090
5080   GOSUB 4500
5085   CS=0
5090 NEXT J
5095 RS=0
5100 IF CS=0 THEN
       GOSUB 1800: I$(I)=TI$(CH)
5110 RETURN
5999 REM DELETE SUBROUTINE VERS. 2
6000 PRINT: PRINT "DELETE THIS RECORD? ";
6070 GET A$:
     IF A$<>"Y" AND A$<>"N" THEN 6070
6080 PRINT A$:
     IF A$="N" THEN 6150
6090 PRINT D$;"WRITE";F$+".DAT,R";P%(I)
6100 PRINT LK: PRINT D$
6110 LK=P%(I)
6120 FOR I1=I+1 TO NI
6130   I$(I1-1)=I$(I1): P%(I1-1)=P%(I1)
6135 NEXT I1
6140 NI=NI-1: SS=0: I=I-1
6150 RETURN
6999 REM SORT SUBROUTINE V. 1
7000 IF NI=-1 THEN
       GOSUB 9000: RETURN
7010 PRINT:
     FOR J=0 TO NH
7020   PRINT "(";J+1;") ";H$(J)
7030 NEXT J
7040 INPUT "SORT ON WHICH HEADING?";J1
7045 J1=J1-1
7050 IF J1<0 OR J1>NH THEN
       RETURN
7055 IF J1<>CH THEN
       CH=J1: GOSUB 1300
```

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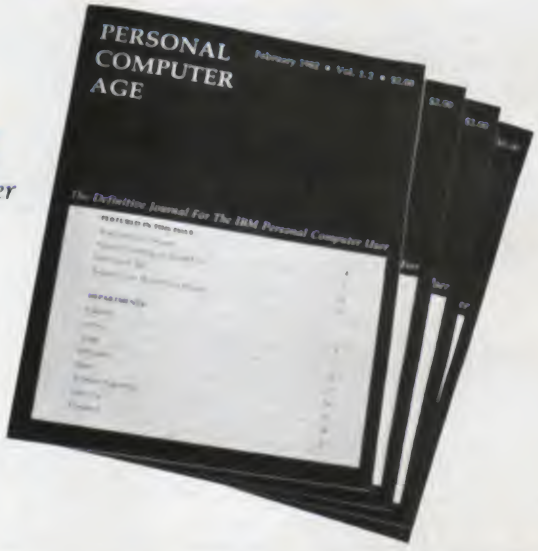

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CIRCLE 151 ON READER SERVICE CARD

you need some method for printing it out. The print routine allows you to print a record, or records, on the screen or the printer, in a default format or one that you define yourself. The print routine is automatically filtered through the search routine, so that you may selectively print almost any subset of your data. The search allows up to eight criteria to be specified, with ANDing or ORing. When all the restrictions have been entered (or before any have), select "Begin" to start printing.

The formatter is a powerful routine that allows you to create special forms for printing your data. Line by line, you specify whether you want items, headings, tabs, or literal strings not dependent on your data. The format information can be saved on disk for future use under the format name you specify. This allows you to print mailing labels, sales receipts, invoices, or whatever form you desire.

Data is automatically saved when you quit the program, but if you want to save a copy of your file in the midst of working (say, before you do a long sort), the save option saves a copy of your current heading and pointer file. The data itself is always saved automatically immediately after it is entered.

Changing and Deleting Data

Once you have information in the machine, it is important to be able to modify it. The delete routine (6000) lets you permanently remove records from the file. To remove a record, the number of items counted (NI) must be decreased by one, and the hole in the data file must be patched. One way to do this is to shift everything in the file down one record to fill the gap, but that requires shifting a great deal of data.

Since we already have an array (P%) that points to the physical location of each record in the disk file, we just have to eliminate the number of the deleted record from the pointer list. If nothing points to the gap, the gap will be ignored. Unfortunately, after deleting a large number of records, there will be many ignored gaps, and each will occupy disk space that may be needed eventually.

The solution is somehow to keep track of where all those gaps are, and to re-use them whenever possible rather than adding new data to the physical end of the disk file. LK, mentioned earlier, is a "link." It points to the first available gap that can be used for new data. When LK = -1, there are no gaps, and new data will go at the end. Each time another gap is created by deleting a record, the current value of LK is put in the position of that record (since it is now just blank space to us anyway), and LK is set to point at the newly vacated postion. When that gap is re-used, the number written to that gap is

```
7060 PRINT "(A) ASCENDING, OR (D) DESCENDING": GET A$
7070 IF A$="A" THEN
       A=1: GOTO 7100
7080 IF A$="D" THEN
       A=2: GOTO 7100
7090 GOTO 7060
7100 FOR I=0 TO NI-1
7110   T=I
7120   FOR I1=T+1 TO NI
7122     PRINT I;"  ";I1
7125     ON A GOTO 7130,7140
7130     IF I$(I1)<I$(T) THEN
           T=I1
7135     GOTO 7145
7140     IF I$(I1)>I$(T) THEN
           T=I1
7145   NEXT I1
7150   IF T=I THEN 7180
7160   T$=I$(T): I$(T)=I$(I): I$(I)=T$
7170   J1=P%(T): P%(T)=P%(I): P%(I)=J1
7180 NEXT I
7200 SS=0: RETURN
7999 REM  SEARCH SUBROUTINE, VERS.2
8000 IF NI=-1 THEN
       GOSUB 9000: RETURN
8010 I1=0: I2=NI: J=0: C1%(0)=-1: BS=1
8015 HOME: PRINT "SEARCH CRITERIA:": PRINT
8020 PRINT "0) RECORD NUMBER"
8030 FOR I=0 TO NH:
       PRINT I+1;") ";H$(I):
     NEXT I
8035 PRINT: PRINT NH+2;") BEGIN"
8040 VTAB 21: INPUT "SELECT : ";I:
     IF I<0 OR I>NH+2 THEN 8040
8045 IF I=NH+2 THEN
       C1%(J)=-1: GOTO 8150
8050 C1%(J)=I-1
8060 VTAB 22: PRINT "(1) SMALLER (2) EQUAL (3) LARGER  ": GET A$:
     IF A$<"1" OR A$>"3" THEN 8060
8070 C2%(J)=VAL(A$)
8080 VTAB 23: PRINT "COMPARED TO : ":
     IF C1%(J)=-1 THEN 8100
8090 INPUT " ";C$(J): J=J+1:
     IF J>7 THEN 8160
8095 GOTO 8015
8100 INPUT " ";I:
     IF I<1 OR I>NI+1 THEN 8100
8105 I=I-1
8110 IF C2%(J)=1 THEN
       I2=I
8120 IF C2%(J)=2 THEN
       I1=I: I2=I
8130 IF C2%(J)=3 THEN
       I1=I
8140 GOTO 8015
8150 IF J<2 THEN 8200
8160 VTAB 22: PRINT "1) ITEM MUST MEET ALL CONDITIONS": PRINT
     "2) ITEM MAY MEET ANY CONDITION  ": GET A$:
     IF A$<"1" OR A$>"2" THEN 8160
8170 BS=VAL(A$)
8200 RS=0: J1=C1%(0)
8210 DS=0:
     FOR J=0 TO 7
8220   IF C1%(J)=-1 THEN
         J=7: GOTO 8240
8230   IF J1<>C1%(J) THEN
         J1=-2
8240 NEXT
8245 IF J1>-1 AND J1<>CH THEN
       CH=J1: GOSUB 1300
8246 IF J1=-2 THEN
       DS=1
8250 I=I1-1:
     FOR I3=I1 TO I2:
       I=I+1
8251   IF DS=0 THEN
         TI$(CH)=I$(I): GOTO 8255
8252   GOSUB 1700
8255   AS=0:
       FOR J=0 TO 7
8260     IF C1%(J)=-1 THEN
           J=7: GOTO 8345
8270     ON C2%(J) GOTO 8280,8290,8310
8280     IF TI$(C1%(J))<=C$(J) THEN 8330
8285     GOTO 8340
8290     IF TI$(C1%(J))=C$(J) THEN 8330
8295     IF RIGHT$(C$(J),1)<>"*" THEN 8340
8298     T=LEN(C$(J))-1:
         IF LEN(TI$(C1%(J)))<T THEN 8340
```

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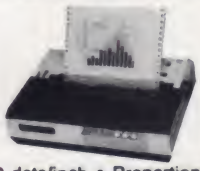

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put back in LK. The result is a "linked list" of empty records, with the most recent empty record pointed at by LK, and each previous one pointed at by the record vacated after it.

To change an existing record (by correcting an address, for example), the program once again funnels you through the search routine (print, delete, and change all use the search routine for finding the record, or records, that you want). The actual change subroutine starts at line 5000, and allows the user to choose to keep each item in a record, change any item, or to keep the remainder of that record. A simple replacement of data is performed if a change is made.

Sorting and Searching

To keep the early version of the "Data Base" simple, the sort routine at line 7000 is a simple insertion sort. Not recommended for large bodies of data, the insertion sort routine goes through the whole file looking for the smallest item, puts that at the beginning, then looks for the smallest item of those remaining, puts it second, and so on. Not the flashiest sort routine available, but relatively easy to understand.

The search routine, referred to earlier because it is actually used for finding records for other routines, allows the user to look for items meeting up to eight separate conditions. Each condition tells whether (a) the item under a specific heading (b) should be less than, equal to, or greater than (c) a specified value. If there is more than one condition specified, the conditions can be ANDed (record must meet all conditions), or ORed (record may meet any condition for acceptance). The choices are stored in arrays C1%, C2%, and C$, for a, b, and c above, respectively. If a record is accepted by the search routine, the appropriate subroutine (print, change, delete) is called by checking variable SB, which is set to point at the appropriate routine.

A note about sorting and searching using numbers is in order here. The program does not yet distinguish between string and numeric data, hence all data is assumed to be character strings. This leads to funny results when sorting numbers like 7, 15, and 273. As string data, the sorted order will be 15, 273, 7 (by first character). The only way to avoid this for the time being is to use leading zeroes on numeric data that will be sorted as such. Above, you would use 007, 015, and 273 to get the proper sequence.

More Information

If you'd like more information about the data base series, or if you would like a copy of the program already on disk, please write to the address given at the beginning of this article. Your comments about the program are most welcome. □

```
8302      IF LEFT$(TI$(C1%(J)),T)=LEFT$(C$(J),T) THEN 8330
8305      GOTO 8340
8310      IF TI$(C1%(J))>=C$(J) THEN 8330
8320      GOTO 8340
8330      IF BS=2 THEN
            AS=1: J=7
8335      GOTO 8345
8340      IF BS=1 THEN
            AS=2: J=7
8345    NEXT J
8350    IF AS=0 AND BS=1 THEN 8355
8352    IF AS<>1 THEN 8380
8355    IF DS=0 THEN
          GOSUB 1700

8360    IF SB<>3 THEN
          GOSUB 3300
8365    IF SB=3 THEN
          GOSUB 5000
8370    IF SB=4 THEN
          GOSUB 6000
8375    IF RS=1 THEN
          I3=I2
8380  NEXT I3
8390  PRINT: PRINT "THAT'S ALL": GET A$: PRINT
8400  RETURN
8999  REM ERROR SUBROUTINE #1
9000  PRINT "THERE'S NO DATA IN MEMORY."
9010  FOR I=1 TO 1000:
      NEXT:
      RETURN
9999  REM PRINT FORMATTING, V.1
10000 IF F$(0)="" THEN 10040
10010 PRINT "SAME FORMAT?":: GET A$: PRINT
10020 IF A$="Y" THEN
        RETURN
10030 IF A$<>"N" THEN 10010
10040 PRINT "(L) LOAD FORMAT, OR (C) CREATE FORMAT":: GET A$: PRINT
10050 IF A$="C" THEN 10200
10060 IF A$<>"L" THEN 10040
10090 ONERR GOTO 10170
10100 INPUT "FORMAT NAME:";A$
10110 PRINT D$;"OPEN";A$+".FMT"
10120 PRINT D$;"READ";A$+".FMT"
10130 INPUT NF
10140 FOR J=0 TO NF:
        INPUT F$(J):
      NEXT
10150 PRINT D$;"CLOSE";A$+".FMT"
10160 RETURN
10170 PRINT "FORMAT NOT FOUND": GET A$: GOTO 200
10200 NF=0: J=0: F$(0)=""
10210 HOME: PRINT "START IN THE UPPER LEFT CORNER AND WORK ACROSS EACH LINE."
10220 PRINT "1:HEADING, 2:ITEM, 3:TAB, 4:NEXT LINE,  5:STRING, 6:END": INPUT
      J1
10230 IF J1<1 OR J1>6 THEN 10220
10240 F$(NF)=F$(NF)+STR$(J1): J=J+1
10250 ON J1 GOTO 10260,10260,10300,10300,10350,10400
10260 FOR T=0 TO NH:
        PRINT T+1;") ";H$(T):
      NEXT
10270 INPUT "WHICH?";T: T=T-1:
      IF T<0 OR T>NH THEN 10270
10280 GOTO 10310
10300 INPUT "HOW MANY?";T:
      IF T<1 OR T>99 THEN
        PRINT "OUT OF RANGE.": GOTO 10300
10310 A$=STR$(T):
      IF T<10 THEN
        A$="0"+A$
10320 F$(NF)=F$(NF)+A$: J=J+2
10330 GOTO 10380
10350 INPUT "STRING:";A$: A$=A$+"!"
10360 IF LEN(A$)+J>255 THEN
        NF=NF+1: J=0: F$(NF)=""
10370 F$(NF)=F$(NF)+A$: J=J+LEN(A$)
10380 IF J>252 THEN
        NF=NF+1: J=0: F$(NF)=""
10390 GOTO 10220
10400 INPUT "FORMAT NAME:";A$
10405 ONERR GOTO 10460
10410 PRINT D$;"OPEN";A$+".FMT"
10420 PRINT D$;"WRITE";A$+".FMT"
10430 PRINT NF:
      FOR J=0 TO NF:
        PRINT F$(J):
      NEXT
10440 PRINT D$;"CLOSE";A$+".FMT"
10450 RETURN
10460 PRINT "DISK ERROR": GET A$: GOSUB 10400
```

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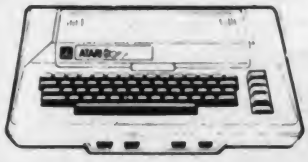

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Searching Techniques

Edward Mitchell

"Steve, you really ought to use a hashing search," said Paul.

"What do you mean, 'hashing?'" Steve asked. "I had hash for dinner last week. What are you talking about?"

"It's a search technique," answered Paul. "That program you've got running is driving the disk drive crazy." The floppy drive was humming and clicking rapidly. "Your program's reading every record in the file until it finds the right one."

"Well just what would you do?" asked Steve, rather indignantly. "How else could I search that file?"

"There are several ways. In your case, hashing would work pretty well, since you have just one name per record and you don't care what order they are in."

"Okay," said Steve. "But how does it work?"

"Hashing converts the name into a number. Then it uses the number as the record number on the disk, so it reads the right record the first time."

"You mean there's no searching?" asked Steve.

"Most of the time," answered Paul, "it's just like magic — you tell it the name, and it reads the record — without searching."

Steve had several questions. He wondered, "How do you convert the name into a number? What if two names convert to the same number? And what about deleting names?" I will try to answer some of them here.

Searching arrays and tables for specific data records is a frequent operation on a computer. Search routines are needed in such diverse applications as electronic telephone directories, inventory and accounting systems, and Basic language compilers. Often, a simple routine is coded to perform a sequential search, where the program loops through all the entries in the table until it finds the desired record. But as the size of the table grows, from say less than 50 items to over several thousand, the time to do the search increases dramatically. In that case, our choices are to buy a faster computer or find a faster way of searching the list. For obvious reasons, the latter solution is preferred.

The first solution that comes to mind is seldom the best way to deal with any problem. There are several "algorithms" for searching through a table that are not so obvious. An algorithm is a precise set of rules to follow when solving a particular problem. In a way, an algorithm is a road map which shows us how to get from one point to another point. Frequently, if we study the geography carefully, a better route may become apparent.

One way to search a list of names is to begin at the beginning of the list and scan until finding a match or until reaching the end of the list.

The sequential search is certainly not the only way to search through a table of names or a disk file. In fact, there are numerous ways of performing a search on the computer. Two of them, binary searching and hashing are both described here.

Even the basic sequential search can be improved by ordering the records so that the most frequently accessed records appear near the top of the list. Figure 1 compares the relative performance of these three table searching methods. The speed of the hashing method is relatively independent of the total table size. Instead, the hashing technique is limited by how "full" the table gets to be.

This is part 1 of a 4 part series. Parts 2 and 3 of the series examine data structures, the study of organizing information. By organizing data efficiently, difficult computing problems can become simple ones. New techniques can be applied to problems, as illustrated in Part 4, where we look at several sorting algorithms.

Part 4 describes the simple Bubble Sort, the first sorting technique learned by most programmers, then moves on to some of the special sorts, such as Quicksort, which sort large amounts of data at high speed.

The Sequential Search

One way to search a list of names is to begin at the beginning of the list and scan until finding a match or until reaching the end of the list. This technique, known as a sequential search, is easy to understand and program. But for a long list, the sequential search can be time consuming. For example, a list of 100 names requires an average of 50 comparisons for a successful search. In the worst case, when the name for which we are searching does not exist, we must examine all 100 names before exhausting all possibilities.

Consider the short list of five names in Figure 2. To search this list for "DAMION," we begin by checking the name stored at N$(1). Since "DAMION" does not match N$(1), the search checks N$(2). Detecting a second mismatch, the

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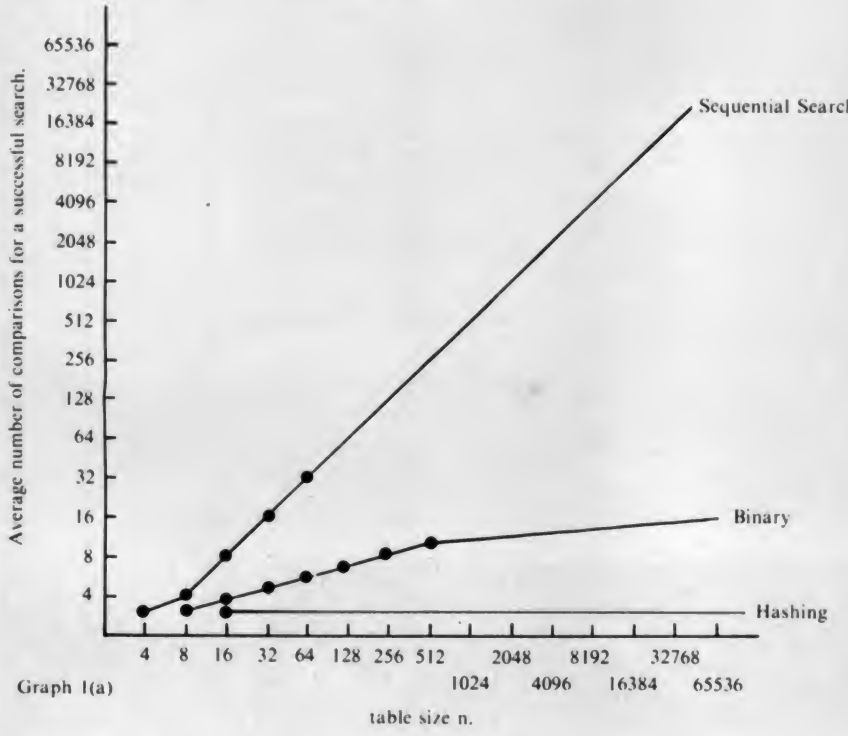
Figure 1. A comparison of three searching techniques. The graph shows that the hashing method is usually the fastest, requiring fewer comparisons than either the binary or sequential searches.



Graph 1(a)

Graph 1(a) Data Points

n	Sequential # Comparisons	Binary # Comparisons	Hashing
4	2	2	
8	4	3	constant
16	8	4	at n 3.
32	16	5	
64	32	6	
128	64	7	
256	128	8	
512	256	9	
1024	512	10	
2048	1024	11	
4096	2048	12	
8192	4096	13	
16384	8192	14	
32768	16384	15	
65536	32768	16	

Figure 2.

```
(a) N$(1) = "JENNY"  = "DAMION"?
    N$(2) = "GEORGE"
    N$(3) = "DAMION"
    N$(4) = "LISA"
    N$(5) = "BARBARA"

(b) N$(1) = "JENNY"
    N$(2) = "GEORGE" = "DAMION"?
    N$(3) = "DAMION"
    N$(4) = "LISA"
    N$(5) = "BARBARA"

(c) N$(1) = "JENNY"
    N$(2) = "GEORGE"
    N$(3) = "DAMION" = "DAMION"
    N$(4) = "LISA"
    N$(5) = "BARBARA"
```

The sequential search in action. This searching method begins a search for "DAMION" at the first name in the list and scans until it finds the name or reaches the end of the list. At (a) the algorithm checks the name at N$(1). Since N$(1) is not "DAMION" the search advances to N$(2) as shown in (b). "DAMION" is finally found in (c).

algorithm moves to N$(3) and finds the name "DAMION."

In general, a successful sequential search of a list with n entries appearing in random order will require an average of n/2 comparisons. The length of time required to perform the search is directly proportional to the size n. If the size of the list is doubled, the time to do the search also doubles. A list of 1000 names takes ten times longer to search than a list of 100 names.

Adding a new name to the list is simple. If we let N equal the number of names in the last, then set N = N + 1 and assign the new name to N$(N). Algorithm 1 defines the sequential search in a Basic-like language. Listing 1 presents a sample sequential search program, written in Advanced Basic on an IBM Personal Computer. All program examples in this series should also run on the Radio Shack TRS-80 Model II and the Osborne 1 and on other computers using Microsoft Basic. As shown in Listing 1, names are deleted from the list by locating the position of the name, sliding all of the remaining names down one place in the list, and setting N equal to N-1.

Algorithm 1 can be improved by a simple change that reduces the number of steps performed in the search loop.

Add Step 0:
  Set N$(N+1) = S$
Remove Step 2.

All searches will now stop when reaching N$(N+1) and the actual execution time is reduced because only two statements, rather than 3 must be executed each time through the loop. As part of Step 3, a check must be made to see if I > N, in which case the algorithm should report that S$ was not found.

Improving the Sequential Search

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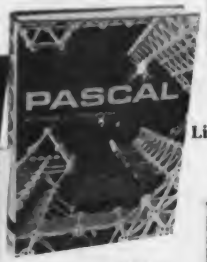

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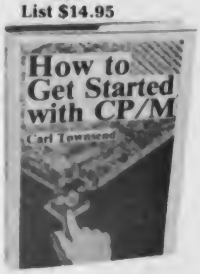

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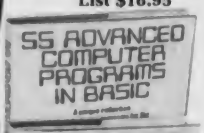

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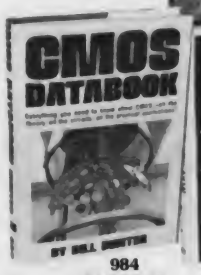

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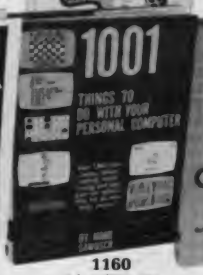

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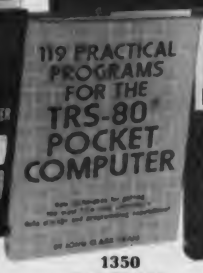

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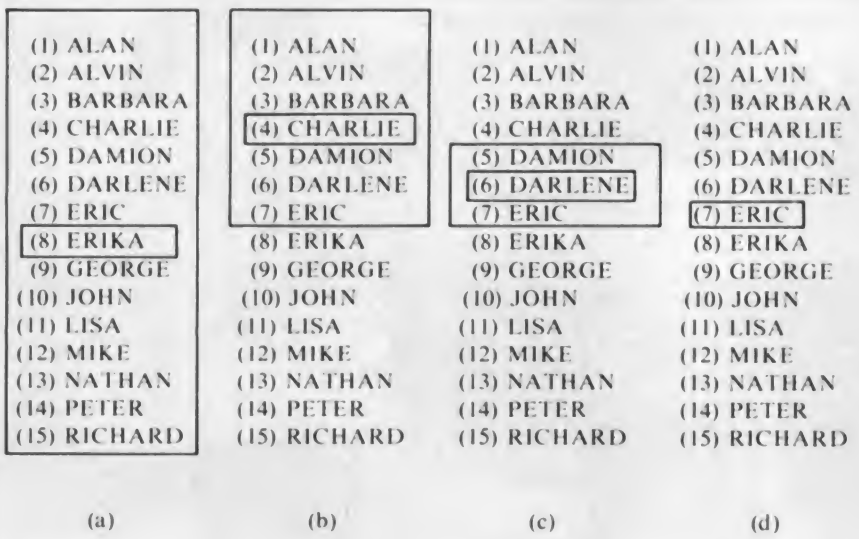
Figure 3.



A "binary" search for "ERIC" starts in the middle of the list. Since "ERIC" is less than "ERIKA" the algorithm discards all names greater than "ERIKA" and concentrates on the first half of the list. In (b) the search has gone too low, so it doesn't have to search any names less than "CHARLIE." In (c), it is still too low in the list, so it advances one name and finds "ERIC" in (d).

from a list of 100 are searched for 50% of the time, it makes sense to place those five names at the start of the list. Then we can expect 50% of the successful searches to be satisfied by the fifth comparison. If we assume that the remaining 95 names in the list are distributed randomly, a successful search will require about 27 comparisons, which is better than the 50 comparisons expected when the names appear in random order.

Since we may not know ahead of time which names will be searched for frequently, the technique is best used for tables that can be set up in advance to reflect the expected distribution of the search requests. But by using a data structure called a *list*, it is easy to create a self-ordering table that automatically orders the entries by frequency of occurrence as names are added or referenced. List structures are described in the references given at the end of this article and in Parts 2 and 3 of this series.

The Binary Search

Using a binary search, the search time can be decreased, with the added benefit that if we increase the size of the table, the

The binary search algorithm requires the names to appear in some sort of order.

search time will increase at a much slower rate. The binary search takes its name from the way in which it repeatedly divides the table into two pieces, until the desired record is located, or until each piece that it has left to search can not be subdivided anymore. The binary search algorithm requires the names to appear in some sort of order. In our examples, the names are arranged alphabetically.

Before studying the details of the binary search, we will run through a search to get a feel for how it works. Instead of starting the search at the beginning of the list, the binary search begins at the middle. To locate "ERIC" in the list shown in Figure 3, we compare "ERIC" to the name appearing in the middle of the list, "ERIKA." Since "ERIKA" is alphabetically greater than "ERIC," we can discard the entire half of the list with names greater than or equal to "ERIKA."

The binary search makes its next guess by checking the name that appears midway between the middle of the list and the beginning of the list. Comparing "CHARLIE" to "ERIC," we see that the search has gone too low. We can then eliminate all of the names less than or equal to "CHARLIE."

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Next, we examine the name in the middle of the interval running from "DAMION" to "ERIC" placing the next guess at location 6, or "DARLENE." Recognizing that there is only one possible space left to try, the search finds "ERIC" at location 7. For the list in Figure 3, the binary search will find the name or determine that it does not exist in four or fewer comparisons. The average successful search in a table of 16 names requires about three comparisons. This is fewer than the eight comparisons expected for the sequential search.

The binary search provides a solution with so few comparisons because it repeatedly divides smaller lists in half. After the first comparison, there are only eight possible locations left to check. Following the next comparison, only four locations remain. Each time through the list it divides the number of remaining names in half.

Finally, when the list cannot be split any further, the name is found or it doesn't exist in the list. Clearly, a search that eliminates one half of the list on the first comparison will be much faster than the sequential search.

Binary Search Performance

For a short list, like the one shown in Figure 3 with just 15 names, the saving in search time is negligible when compared to the sequential search. Besides, the actual time that the computer takes to search a short list is so small that it really makes little difference how long a particular search takes.

The computer overhead required for the additional comparisons and to do the arithmetic required of the binary search can actually make the binary search take longer than the sequential search when working with small lists. A theoretically fast algorithm may not be very fast at all when it is translated into a program, running with the constraints of a real computer.

The binary search can also be optimized by ordering the table by frequency of occurrence.

But as the size of the list grows, the advantage of the binary search is apparent. For a list of up to 65535 names, the binary search guarantees fewer than 16 comparisons before terminating the search. That's two thousand times better than the average successful sequential search for the same list. The maximum number of comparisons required for any list of size n is equal to the integer base 2 logarithm of n, plus 1.

For those not familiar with logarithms, the number of comparisons is roughly equal to the number of times that n can be repeatedly divided by 2, while continuing to have an integer remainder (e.g. log 8 base 2=3, because 8/2=4, 4/2=2, and 2/2=1, hence three divisions).

Adding Names to the Ordered Table

Adding names to an ordered table is a time-consuming and inefficient process (see Algorithm 3). To add a name, we first search the table to see if it already exists. If it does, the algorithm reports an error. Otherwise, the binary search has stopped at the point where it should be added. So all the names that follow are shifted over one entry in the table and the new name is inserted.

For example, to insert "DAVID" into the list in Figure 4, we first call the binary search routine (Algorithm 2) to see if the name is in the table. Since the name is not in the table, we make a "hole" where the name should go. Algorithm 2 finishes the search with G having the value of the

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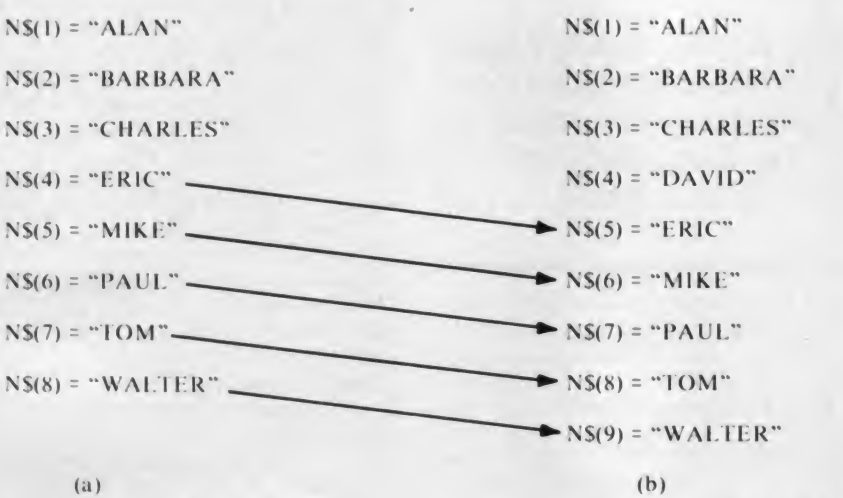
location just before the location at which the name should be inserted.

Figure 4 illustrates the insertion in which the names that follow "DARLENE" slide upwards in the array, and "DAVID" is inserted at location 7. Algorithm 3 may be improved by using "pointers" to strings, and then shifting pointers rather than strings. The concept of pointers is introduced in Part 2, and discussed further in Parts 3 and 4.

The binary search can also be optimized by ordering the table by frequency of occurrence. Using a "binary tree," the most frequently accessed name in the list appears at the center of the table so that it is always examined first in any search. Binary trees are described in Parts 2 and 3 of this series, and in several of the references at the end of this article.

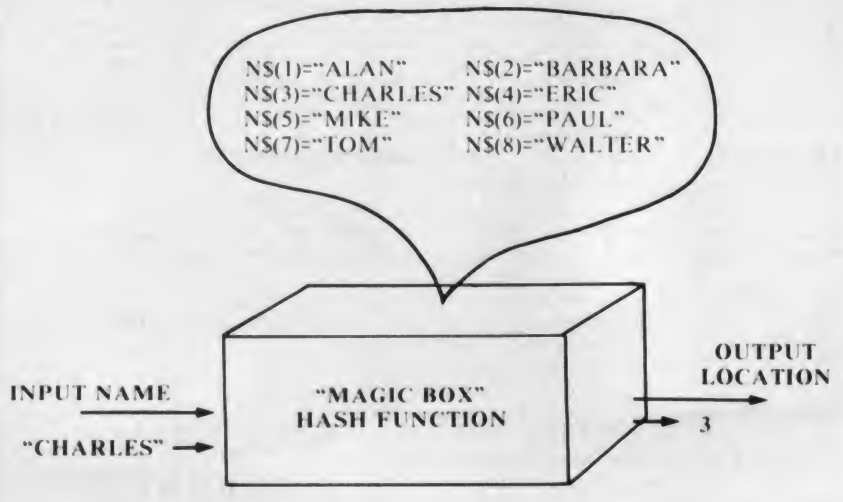
Listing 2 is a set of sample subroutines to implement a binary search in Basic. Lines 1 to 999 are omitted since they are the same as the lines shown in Listing 1. Subroutine 1000 adds the name S$ to the table; subroutine 2000 searches the table for the name S$, returning the location in variable G, and subroutine 4000 deletes the name at location G. The program should GOSUB 2000 before jumping to 4000 so that G will be set to the proper location.

Figure 4.



Adding "DAVID" to an ordered table. After finding the correct position for the new name, all of the following entries are slided upwards in the list, as shown above. Then N$(4) is assigned the value of "DAVID."

Figure 5.



The "hash function" works like a magic box, converting the name "CHARLES" into a number that is also the location where "CHARLES" is kept in the list. Actually, no magic is involved. The hash function uses simple arithmetic to convert the character string into a number. Of course, more than one name may hash to the same number, producing a "collision."

Hashing

The best search would be a crystal ball that prophetically reveals the location of the name that we seek. Envision a magic box, like the one in Figure 5, that given a name, simply outputs the correct location. Such a strategy is called "hashing," literally turning the search name into a number that is the actual index of an array of names.

To see how hashing works, we invent a function HASH(STRING), which converts the string to an integer as follows:

Location = HASH (S$)

where S$ is the name that we are looking for. A name is converted into a number by assigning a numeric value to each character

The best search would be a crystal ball that prophetically reveals the location of the name that we seek.

in the name and then summing the values. We will equate the letter A with the number 65, the letter B with 66, and so on, up through the letter Z which has the value of 90. This letter-number Correspondence is used because these numbers are the ASCII codes that the computer uses to represent characters internally. Most Basics have a function such as

C = ASC (S$)

which returns the ASCII code of the first character in S$. For example, if S$ = "D", then ASC(S$) will yield 68.

To produce the hash, the hash function sums the character codes for each of the characters in the string. For example, to hash "DOUG," the values for each of the characters are summed as follows:

D		O		U		G		Sum
68	+	79	+	85	+	71	=	303

"DOUG" has a hash value of 303.

Listing 1. The Sequential Search Technique.

```
10 MAX=100
20 DIM N$(MAX)
100 PRINT "ENTER:  A(DD  L(OOKUP  P(RINT  D(ELETE  Q(UIT ? ";
110 C$=INPUT$(1): PRINT C$
120 ON INSTR (1, "ALPDQ", C$) + 1 GOSUB 100, 200, 300, 400, 500, 600
130 GOTO 100
200 REM ------------------------------------------------------------
210 REM - ADD NAMES
220 INPUT "ENTER NAME TO ADD ? ",S$
225 IF S$ = "" THEN RETURN
230 GOSUB 2000
240 IF F=0 THEN GOSUB 1000
250 IF F=1 THEN PRINT S$;" IS ALREADY IN THE LIST.": RETURN
260 IF F=2 THEN PRINT "TABLE IS FULL AT ";MAX;" ENTRIES.": RETURN
270 RETURN
300 REM ------------------------------------------------------------
310 REM - LOOKUP A NAME
320 INPUT "ENTER NAME TO LOOKUP ? ",S$
330 GOSUB 2000
340 IF G=0 THEN PRINT "NOT FOUND" ELSE PRINT "FOUND AT LOCATION ";G
350 RETURN
400 REM ------------------------------------------------------------
410 REM - PRINT OUT THE TABLE
420 GOSUB 3000
430 RETURN
500 REM ------------------------------------------------------------
510 REM - DELETE A NAME
520 INPUT "ENTER NAME TO DELETE ? ",S$
530 GOSUB 2000
540 IF F = 0 THEN PRINT "NOT FOUND" ELSE GOSUB 4000: PRINT "DELETED"
550 RETURN
600 REM - QUIT
610 GOTO 32767
1000 REM ------------------------------------------------------------
1010 IF N=MAX THEN F=2: RETURN ELSE F=0
1020 N = N + 1
1030 N$ (N) = S$
1040 RETURN
2000 REM ------------------------------------------------------------
2010 REM - LOOK UP A NAME
2020 G = 1
2030 IF G > N THEN F=0: RETURN
2040 IF S$ = N$ (G) THEN F=1: RETURN
2050 G = G + 1
2060 GOTO 2030
3000 REM ------------------------------------------------------------
3010 REM - PRINT OUT TABLE OF NAMES
3020 FOR I = 1 TO N
3030 PRINT N$ (I),
3040 NEXT I
3050 PRINT
3070 RETURN
4000 REM ------------------------------------------------------------
4010 REM - DELETE NAMES
4020 N = N - 1
4030 FOR I = G TO N
4040 N$ (I) = N$(I + 1)
4050 NEXT I
4060 RETURN
32767 END
```

If the names are stored in an array defined as DIM N$(100), then there is a slight problem: How do we use the number 303 as an index to N$() when the index must be less than or equal to 100? To scale the hash value to the range 1 to 100, 303 is divided by 100 and the remainder of 3 is used as the actual hash value.

For example, if we define R as the remainder of X/Y, then in most Basics, we could write,

```
    R=MOD (X, Y)
or  R=X MOD Y
or  R=(X/Y - INT (X/Y)) * Y
```

To place "DOUG" in the hash table, N$(3) is set to "DOUG." Later, when searching for "DOUG" the same hash index of 3 is produced, immediately finding the name at N$(3).

Handling Collisions

A problem arises when we give the hash function another name that hashes to location 3. For example, the name "DEB" also hashes to 203.

D		E		B		Sum
68	+	69	+	66	=	203

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Listing 2. Binary Search Subroutines.

```
1000 REM ------------------------------------------------------------
1010 REM - ADD NAMES
1012 IF N=MAX THEN F=2: RETURN ELSE F=0
1015 N = N + 1
1020 FOR I = N TO G + 1 STEP -1
1030 N$ (I) = N$(I - 1)
1040 NEXT I
1060 N$ (G + 1) = S$
1070 RETURN
2000 REM ------------------------------------------------------------
2010 REM - LOOK UP A NAME
2020 L = 1: R = N
2030 G=INT((L+R)/2)
2040 IF R < L THEN F = 0: RETURN
2050 IF S$ = N$ (G) THEN F = 1: RETURN
2060 IF S$ < N$ (G)  THEN R = G - 1 ELSE L = G + 1
2070 GOTO 2030
3000 REM ------------------------------------------------------------
3010 REM - PRINT OUT TABLE OF NAMES
3020 FOR I = 1 TO N
3030 PRINT N$ (I),
3040 NEXT I
3050 PRINT
3070 RETURN
4000 REM ------------------------------------------------------------
4010 REM - DELETE NAMES
4020 N = N - 1
4030 FOR I = G TO N
4040 N$ (I) = N$(I + 1)
4050 NEXT I
4060 RETURN
5000 REM ------------------------------------------------------------
5010 REM - QUIT
32767 END
```

Listing 3. The Hashing Technique.

```
1000 REM ------------------------------------------------------------
1010 REM - ADD NAMES
1030 IF N >= MAX - 1 THEN F = 2: RETURN
1040 N = N + 1: F = 0
1050 GOSUB 6000
1060 IF N$ (H) = "" OR N$(H) = "*" THEN N$(H)=S$: RETURN
1070 H = H - 1
1080 IF H = 0 THEN H = MAX
1090 GOTO 1060
2000 REM ------------------------------------------------------------
2010 REM - LOOK UP A NAME
2020 GOSUB 6000
2030 IF N$ (H) = "" THEN F = 0: RETURN
2040 IF N$ (H) = S$ THEN F = 1: G = H: RETURN
2050 H = H - 1
2060 IF H = 0 THEN H = MAX
2070 GOTO 2030
3000 REM ------------------------------------------------------------
3010 REM - PRINT OUT TABLE OF NAMES
3020 FOR I = 1 TO MAX
3030 IF LEN(N$(I))>0 THEN IF N$(I) <> "*" THEN PRINT N$(I),
3040 NEXT I
3050 PRINT
3070 RETURN
4000 REM ------------------------------------------------------------
4010 REM - DELETE NAMES
4020 N$ (H) = "*"
4025 N=N-1
4030 RETURN
5000 REM ------------------------------------------------------------
5010 REM - QUIT
5020 GOTO 32767
6000 REM ------------------------------------------------------------
6010 REM COMPUTE H = HASH (S$)
6020 H = 0
6030 FOR I = 1 TO LEN (S$)
6040 H = H + ASC(MID$(S$,I,1))
6050 NEXT I
6060 H = H MOD MAX + 1: REM H = REMAINDER OF H/MAX
6070 RETURN
32767 END
```

The hash of 203 is scaled to the range of 1 to 100 giving it the value of 3. On checking N$(3), we see that the name "DOUG" is already in the table. The algorithm detects a "collision" whenever two or more names hash to the same location. There are several ways of dealing with collisions, but only one simple method is shown here.

When "DEB" hashes to an index that is already used, the algorithm decrements the hash value and tries the next entry at location 2. If N$(2) is not in use then the algorithm sets N$(2) to "DEB." But in the case that N$(2) is already used, the algorithm decrements the index again. The hash index continues to decrement until a free entry is found. Upon reaching 0, the index "wraps around" to 100 and continues decrementing until finding a free spot in the table.

In the worst case, the hashing algorithm can degenerate into a sequential search of the list, looking for the next to the last free spot. For this reason, a hash function should tend to eliminate collisions and avoid any tendency for names to cluster about a particular area within the table. For maximum efficiency, the table should never fill up to more than about 80% of its maximum size.

At about 80% of table capacity, the hashing method will require about three comparisons for a successful search, irrespective of the table size. For an unsuccessful search, even in a large table, only 13 comparisons are expected.

Searching the Hash Table

When searching for "DEB," the same process that was used to add "DEB" to the table is repeated. "DEB" is hashed to location 3. Finding a mismatch, the index value is decremented to 2 and the name is found.

The search finishes when the algorithm finds the name or when the index points to an unused slot in the table. If the name doesn't appear in the table and there are no unused slots, then the search will loop indefinitely. Therefore, a table of size N can only hold N-1 names; there must always be at least one empty slot in the table.

Removing Hash Entries

Deleting names from the hash table is not as simple as it first appears. For example, if we remove the name "DOUG" from location 3, the first time that we search for "DEB," we'll hash to location 3, and seeing it empty, conclude that "DEB" is not in the table. To solve this problem, we mark location 3 as "deleted," rather than unused, so that the search will correctly continue on to location 2.

Listing 3 shows the addition, deletion and searching of data records in a hash table. As with the previous listings, S$

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Elementary—Volume 3 (Social Studies)
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The sell series, SELL APPLES, SELL PLANTS, SELL LEMONADE and SELL BICYCLES which appears on the ELEMENTARY VOLUME 3 diskette can be used to teach elementary economics to students in grades 3-6. CIVIL will reenact battles of the CIVIL war while STATES and STATES 2 provide drill and practice on the location of states in the U.S. and their capitals.

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Two mathematics programs ESTIMATE and MATHGAME provide reinforcement on estimating and basic facts. Food chains in fish can be studied through ODELL LAKE while ODELL WOODS deals with food chains in animals. SOLAR DISTANCE teaches the concepts of distances in space and URSA provides a tutorial on constellations.

Elementary—Volume 5 (Language Arts)
MECC-719, $24.95

ELEMENTARY—VOLUME 5 deals with the reading concept of prefixes. The diskette contains five lessons which both teach the prefixes of UN, RE, DIS, PRE, and IN. Two review drills, DRAGON FIRE and PRE-APP II, are also contained on the diskette.

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Science—Volume 3 (Middle School)
MECC-707, $24.95

The FISH program through the use of low resolution graphics shows the circulatory system of a fish. Simulations like ODELL LAKE which is used to explore food chains, URSA which teaches about constellations, and QUAKES which simulates earthquakes are on the diskette. MINERALS can be used in the area of earth science to identify 29 minerals by having students perform simple tests.

Mathematics—Volume 1 (Senior High)
MECC-706, $24.95

BAGELS, SNARK, ICBM, and RADAR will teach students logic while reinforcing the concepts of plotting prints or angle measurements. ALGEBRA provides a drill and practice in solving equations. Three programs on the diskette can be used in plotting equations on a grid. SLOPE which is designed for use in ninth grade with linear functions, POLYGRAPH which will plot any equation on a rectangular coordinate system, and POLAR which graphs functions on polar coordinates.

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Algorithm 1
Sequential Search Algorithm

Let N$() be an array of character strings containing the list of names to be searched. Let N be the number of names in N$(). Example: If there are five names, then they appear in N$(1) through N$(5), and N is equal to five. Let S$ be the name for which the algorithm is to search. I is used to keep track of the current position in the list.

Step	Action
1)	Set I = 1
2)	IF I > N THEN terminate search, S$ not found
3)	IF S$ = N$(I) THEN terminate search, S$ found at location I
4)	Set I = I + 1 and GOTO Step 2

Algorithm 2
The Ordered Table Binary Search

Let N$() be an array of names appearing in alphabetical order. Let N be the number of names in the list. Let L mark the lowest bound of the interval of names to look at, and let R mark the upper bound. Let G be the "guess" appearing midway between L and R. S$ is the name to be searched for in table N$().

Step	Action
1)	Set L=1 and R=N These are the initial bounds of the interval.
2)	G = INT ((L + R)/2) Make a guess midway between L and R.
4)	If S$ = N$(G) THEN terminate search, S$ found at G
5)	If S$ < N$(G) THEN R = G-1 ELSE L = G + 1 Set new boundaries.
6)	GOTO Step 2

Algorithm 3
Inserting a New Name Into An Ordered Table

N$(), S$, N, and G are the same as for Algorithm 2. I is a dummy variable used as a FOR/NEXT loop control value.

Step	Action
1)	Perform Algorithm 2.
2)	If S$ was found then terminate with an error — the name already exists in the table.
3)	N = N + 1
4)	FOR I = N TO G + 1 STEP - 1 N$(I) = N$(I-1) NEXT I Shift the names over one place in the table.
5)	N$(G+1) = S$ Place the name into the table.

Algorithm 4
Searching the Hash Table

Let S$ be the name to search for in the table of names N$(). The function HASH() is as described in the text. S is equal to the size of the array N$().

Step	Action
1)	H = HASH (S$)
2)	IF N$(H) = " " THEN exit, S$ was not found
3)	ELSE IF N$(H) = S$ THEN exit, S$ found at location H
4)	H = H-1 Decrement and try next position
5)	IF H = O THEN H = S
6)	Goto Step 2

Algorithm 5
Adding New Names to the Hash Table

S is equal to the maximum table size - 1. For example, if MAX = 100, then S = MAX - 1, or 99.

Step	Action
1)	IF N = S THEN error, the table is full
2)	N = N + 1 Increment total entries
3)	H = HASH (S$) Compute Hash
4)	IF N$(H) = " " OR N$(H) = "*" THEN N$(H) = S$; Exit with the name inserted
5)	H = H-1 Collision occurred, so decrement
6)	IF H = O THEN H = S
7)	Goto Step 4

Algorithm 6
Deleting Names From the Hash Table

Step	Action
1)	Call Algorithm 4
2)	If S$ was not found then error Else N$(H) = "*", Mark it as deleted.

holds the name to add to or search for in the table. To delete a name, call subroutine 2000 and verify that the name exists, and then GOSUB 4000 to actually delete it.

It is not necessary to sum all of the characters in the name. If you know that there are only a few names, you might form the hash from just the first few characters of each name. This technique is very useful in a compiler or interpreter's keyword symbol table, or as a command recognizer in a program. As an example, consider a small Basic interpreter having the keywords IF, THEN, GOTO, GOSUB, FOR, NEXT, RETURN, PRINT, and INPUT. If we hash all of those keywords by their first letter, the only collision that occurs is between GOTO and GOSUB.

Summary

Algorithms describe the precise set of rules that a computer follows in order to solve a problem. The sequential search algorithm is just one of many methods available for searching through an array or file of records. The binary search and hashing algorithms show that big improvements can be made to a simple problem like searching a table of names. And of course, there are many more algorithms and still more variations on each.

Programs spend a large part of their execution time manipulating data structures; therefore, our programs should use the best methods available to organize information within the memory of the computer. Parts 2 and 3 of this series expand on the subject of data structures and show how "lists" and "trees" can be programmed in Basic.

Part 2 presents the design of a simple data base system used to produce geneological pedigree charts. The program source, written in Basic, will appear in Part 3. Part 4 concludes the series with a look at five different sorting methods, including the fast Shellsort and Quicksort algorithms.

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Atari Diskfile Tutorial

Jerry White

Many new computer owners are anxious to learn how to write their own useful programs. After reading the literature packed with the machine, the new owner is often overwhelmed. Realizing that one does not learn any programming language overnight, a seemingly endless period of trial and error usually follows. The "hacker" is often seen burning the midnight oil and arguing with a defenseless TV or monitor.

If he perseveres long enough, reasonably simple programs are written. The new programmer is now ready for bigger and better things.

Assuming he has a disk drive, our "hacker" gains experience with DOS and the loading and saving of programs. Now he is ready to write a database program.

The datafile may consist of a simple list of record albums for a start, to be followed by the inevitable Personal Finance System. If you are at this point in your programming career, or think you might be in the near future, read on.

Start with something very simple. Don't try to write that financial package yet. There is much to learn first about file structure and I/O. I/O stands for Input/Output. Input is data being read by a program. Output is data being created by a program. A file consists of one or more records, and a record is an item within a file. Records may be broken down further into fields. We will be using simple records containing a single 20-character field as our record, and create a sample 10-record datafile.

To understand data processing techniques, it is often easier to grasp reality than it is to learn by reading. I have found that doing is the best way to learn, and that Atari Basic can be easy to understand if it is explained in English.

Atari Basic allows variable names of any length, plus REM or remark statements. Remarks or comments within a program help identify routines and explain exactly what the program is doing.

Meaningful variable names also make program reading much easier. For example, the sample Diskfile program uses the variable RECNUM to store the current total of records. RECNUM is an abbreviation I used to mean record number. So why didn't I use the variable RECORDNUMBER you ask? RECNUM is a compromise between that 12-letter name and the other extreme which could have been R.

The RECNUM variable is used often. The tradeoff is readability against the programmer's keystrokes and sometimes program efficiency. If R is used instead of RECORDNUMBER, and that variable is used ten times, using R saves 110 keystrokes. In a tutorial program such as this one, RECNUM is the acceptable compromise.

The Diskfile tutorial program demonstrates many of the common functions required in a simple database type program. By using the program and studying the program code, you will learn how datafiles may be handled in Atari Basic.

```
0 REM FILES (c) 1981 by Jerry White
1 REM ATARI DISKFILE TUTORIAL DEMO
2 REM
100 DIM DRIVE$(3),FILE$(12),DRIVEFILE$(15),RECORD$(10),ANSWER$(1)
110 DIM SECTOR(20),BYTE(20),DIRECTORY$(20):REM DIMENSION STRINGS AND ARRAYS
111 REM
120 GRAPHICS 0:POKE 82,2:POKE 83,39:REM CLEAR SCREEN AND SET MARGINS
130 POKE 201,5:REM SET PRINT TAB WIDTH TO 5 SPACES
140 ? :? "TYPE OPTION NUMBER THEN PRESS RETURN"
150 ? :? ,"(1) CREATE A DISK FILE":REM GOTO 1000
160 ? :? ,"(2) READ A DISK FILE":REM GOTO 2000
170 ? :? ,"(3) ADD TO A DISK FILE":REM GOTO 3000
180 ? :? ,"(4) UPDATE A DISK FILE":REM GOTO 4000
190 ? :? ,"(5) DISPLAY DISK DIRECTORY":REM GOTO 5000
200 ? :? ,"(6) END PROGRAM":REM GOTO 9140
210 ? :? ,"YOUR CHOICE";:GOSUB 7000
220 TRAP 8000:LINE=120:HIGHNUMBER=6:NUMBER=VAL(ANSWER$)
230 IF NUMBER<1 OR NUMBER>6 THEN GOTO 8000
240 ON NUMBER GOTO 1000,2000,3000,4000,5000,9140
250 REM
1000 LINE=6100:GOSUB 7100:TRAP 9100:GRAPHICS 0
1010 CLOSE #1:OPEN #1,8,0,DRIVEFILE$
1020 ? :? "CREATING ";DRIVEFILE$:? :RECORD$="1234567890"
1030 FOR DEMO=1 TO 10
1040 ? #1;RECORD$
1050 ? "WRITING RECORD NUMBER ";DEMO
1060 NEXT DEMO
1070 ? :? "10 RECORD DEMO FILE CREATED"
1080 ? :? "CLOSING ";DRIVEFILE$
1090 CLOSE #1
1100 GOTO 6100
```

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Atari Diskfile, continued...

Once you have entered the program and corrected any typing errors, run through each of the options beginning with number one.

It is important to understand the terminology used here. CREATE means just that. In this case it means create from scratch. Note that the create routine actually begins at line 1000 and that line 1010 contains an OPEN command. The number 8 in that command means write only. If a file is opened using this variable, and a file with the exact same name is found on your diskette, the old file will be deleted automatically.

Using option two, a file is read from disk and displayed on the screen. This does not in any way alter the disk file.

Option three is used to ADD data to an existing disk file only. The term APPEND is often used in this case. In plain English, the term APPEND means, "add to the end of this file."

Option four is used to UPDATE the records of an existing file. This means you will alter, correct, or change a record. This procedure is a bit more complicated than the others since we do not know in advance which record the user may choose to update. The technique used in this demo program is known as Random Access Updating. An index consisting of SECTOR and BYTE locations is created and stored in an array. This gives us the exact spot at which each record begins.

Since we are using fixed length records of 20 characters each, we can read a specific record into a string, change it in the string, then rewrite the string onto the disk. This becomes a real time saver when many records must be updated in a large disk file.

Option five is used to READ and display a specific file called the DIRECTORY FILE. This DOS-generated file contains the table of contents of your diskette. This file is also known as the VTOC or Volume Table Of Contents. For display only, this routine does the same thing as DOS option A.

Although some error trapping has been built in, many possible error conditions are not corrected or fully explained by this program. Error trapping and human engineering account for a great deal of planning and program code. This is not a cop out on my part. I plan to cover this subject in a future article. The point here is to provide an example of diskfile handling. Accounting for all possible errors could easily double the size of the program.

That's about it for now. I suggest you use my program as is, then experiment by making minor changes and noting the results. When you're ready to write your own diskfile handling program, feel free to use these routines. □

```
1110 REM
2000 LINE=6100:GOSUB 7100:TRAP 9100:GRAPHICS 0
2010 CLOSE #1:OPEN #2,4,0,DRIVEFILE$:RECNUM=0:LINE=6100
2020 INPUT #2,RECORD$
2030 RECNUM=RECNUM+1
2040 ? "RECORD NUMBER ";RECNUM;
2050 ? ,RECORD$
2060 GOTO 2020
2070 REM
3000 LINE=3000:GOSUB 7100:TRAP 9100:GRAPHICS 0
3010 CLOSE #3:OPEN #3,9,0,DRIVEFILE$
3020 GRAPHICS 0:? :? ,"ADD RECORD(S) ROUTINE:"
3030 ? :? ,"ENTER 10 CHARACER RECORD"
3040 ? :? ,"OR JUST PRESS RETURN TO EXIT":? :GOSUB 6000
3050 RECLEN=LEN(RECORD$):IF RECLEN=0 THEN 3200
3060 IF RECLEN=10 THEN 3090
3070 FOR BLANK=RECLEN+1 TO 10:RECORD$(LEN(RECORD$)+1)=" ":NEXT BLANK
3090 PRINT #3;RECORD$
3100 ? :? "PRESS START TO ENTER ANOTHER RECORD"
3110 ? :? "PRESS OPTION FOR OTHER OPTIONS...";
3120 IF PEEK(53279)=6 THEN 3020
3130 IF PEEK(53279)=3 THEN 3200
3140 GOTO 3120
3200 ? :? :? ,"ADDING RECORD(S) TO DISK":CLOSE #3:GOTO 120
3210 REM
4000 LINE=4100:GOSUB 7100:TRAP 9100:GRAPHICS 0
4010 CLOSE #4:OPEN #4,12,0,DRIVEFILE$:LINE=4100
4020 ? :? ,,"CREATING INDEX":RECNUM=0
4030 NOTE #4,SECTOR,BYTE
4040 RECNUM=RECNUM+1
4050 SECTOR(RECNUM)=SECTOR:BYTE(RECNUM)=BYTE
4060 INPUT #4,RECORD$:? ," RECORD ";RECNUM,RECORD$
4070 ? ,"SECTOR=";SECTOR,"BYTE=";BYTE
4080 ? :GOTO 4030
4100 RECNUM=RECNUM-1
4110 ? :? "PRESS START TO UPDATE A RECORD"
4120 ? :? "PRESS OPTION FOR OTHER OPTIONS";
4130 IF PEEK(53279)=6 THEN 4200
4140 IF PEEK(53279)=3 THEN CLOSE #4:GOTO 120
4150 GOTO 4130
4200 GRAPHICS 0:REM RANDOM ACCESS RECORD UPDATE ROUTINE
4210 ? :? ,"DISKFILE CONTAINS ";RECNUM;" RECORDS"
4220 ? :? "ENTER RECORD NUMBER TO BE UPDATED";
4230 TRAP 4220:INPUT UPDATE:TRAP 40000
4240 UPDATE=INT(UPDATE):IF UPDATE<1 OR UPDATE>RECNUM THEN 4230
4250 POINT #4,SECTOR(UPDATE),BYTE(UPDATE)
4260 INPUT #4,RECORD$:? :? RECORD$
4270 ? :? "ENTER NEW RECORD #";UPDATE;:INPUT RECORD$
4280 RECLEN=LEN(RECORD$):IF RECLEN=10 THEN 4300
4290 FOR BLANK=RECLEN+1 TO 10:RECORD$(LEN(RECORD$)+1)=" ":NEXT BLANK
4300 POINT #4,SECTOR(UPDATE),BYTE(UPDATE)
4310 PRINT #4;RECORD$:? :? ,"RECORD HAS BEEN UPDATED"
4320 GOTO 4110
4330 REM
5000 GRAPHICS 0:POKE 201,10:? :? ,"  DISK DIRECTORY":? :TRAP 9100
5010 CLOSE #5:OPEN #5,6,0,"D:*.*":REM OPEN DISK DIRECTORY FOR ALL ENTRIES
5020 LINE=6100
5030 INPUT #5,DIRECTORY$
5040 ? ,DIRECTORY$
5050 GOTO 5030
5060 REM
6000 RECORD$="":POKE 764,255:REM RECORD STRING AND LAST KEY PRESSED=NULL
6010 INPUT RECORD$:RETURN
6020 REM
6100 FOR FILE=1 TO 5:CLOSE #FILE:NEXT FILE:REM CLOSE ALL FILES
6110 POKE 201,5:? :? ,"PRESS RETURN FOR OPTIONS";
6120 GOSUB 7000:GOTO 120:REM PAUSE TO READ SCREEN THEN GO TO OPTIONS
6130 REM
7000 ANSWER$="":POKE 764,255:INPUT ANSWER$:RETURN :REM 1 CHARACTER INPUT
7010 REM
7100 GRAPHICS 0:REM DRIVE NUMBER AND FILENAME INPUT ROUTINE
7110 ? :? "TYPE DISK DRIVE NUMBER (1-4)";:HIGHNUMBER=4:GOSUB 7000
7120 LINE=7110:TRAP 8000:NUMBER=VAL(ANSWER$):TRAP 9100
7130 IF NUMBER<1 OR NUMBER>4 THEN 8000
7140 DRIVE$="D":DRIVE$(LEN(DRIVE$)+1)=ANSWER$
7150 DRIVE$(LEN(DRIVE$)+1)=":"
7200 ? :? "TYPE FILE NAME";:INPUT FILE$:IF LEN(FILE$)=0 THEN 7200
7210 DRIVEFILE$=DRIVE$
7220 DRIVEFILE$(LEN(DRIVEFILE$)+1)=FILE$:RETURN
7230 REM
8000 ? :? "PLEASE TYPE A NUMBER FROM 1 THRU ";HIGHNUMBER:REM ERROR ROUTINE
8010 GOSUB 9000:GOTO LINE:REM GO BACK TO LINE NUMBER (LINE)
9000 ? CHR$(253):REM RING ERROR BELL
9010 FOR COUNT=1 TO 300:NEXT COUNT:RETURN
9020 REM
9100 IF PEEK(195)=136 THEN GOTO LINE:REM ERROR WAS END OF FILE
9110 REM DISPLAY ERROR NUMBER AND LINE AT WHICH ERROR OCCURRED THEN END
9120 ? :? " ERROR ";PEEK(195);" AT LINE ";PEEK(186)+PEEK(187)*256
9130 LIST PEEK(186)+PEEK(187)*256:GOSUB 9000
9140 TRAP 40000:END :REM ELIMINATE ANY PREVIOUSLY SET TRAP AND END PROGRAM
```

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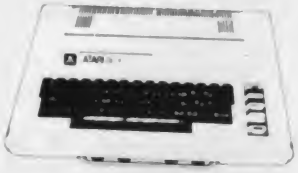

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Getting Along Without TAB —An Atari Translation

Fred Pinho

The lack of a TAB command in Atari Basic is a source of irritation to many Atari users. The most common problem occurs when outputting formatted text; cumbersome programming is necessary to accomplish what is relatively simple in other Basic dialects.

It can also be a problem in other areas such as games where a given character must be printed at varying locations on a line. To illustrate this, the car race program shown in Listing 1 was translated into Atari Basic. This program originally appeared in the November 1980 *Creative Computing* as a translation from DEC PDP/11 to PET Basic. The game depends on the printing of the walls of the road and of the car under control of the TAB command.

The Atari does have a keyboard-controlled tab function which can be used in the programming mode by printing it in properly configured strings. However, running the game in that manner would be difficult. Fortunately there is another way.

The Atari does not print at the keyboard-set tabs unless specifically requested to do so by an imbedded tab request within the string to be printed. Rather it prints at standard "print positions" positions 0, 11, 21, 31 on a 38-character line).

Separating the desired strings by a comma causes each string to be printed starting at a standard position. The width between each print position is controlled by memory location 201. Don't be fooled by its name in the Atari reference manual. Although it is called the "Print Tab Width," it really controls the width of the print positions (sneaky).

The Atari translation is shown in Listing 2. The parameters to be used in controlling the width of the print positions are in line 40: B1 (left side of the road), B2 (right side of the road) and T (the car). The actual printing is controlled by lines 150-153. Here location 201 is POKEd with the width for the left side of the road. Then printing a blank followed by a comma spaces the invisible cursor to the second print position (controlled by B1). D$, which forms the sides of the road, is then printed.

Since the cursor has now moved down to the start of the next line, location 84 (current cursor row) is decremented by 1 to cause a return to the original line. The procedure is now repeated with the width set for the car (line 152). Here a graphics heart is used for the car. It doesn't show on the listing so type control-comma

Fred Pinho, 676 Rollingwood Way, Valley Cottage, NY 10989.

Listing 1.

```
40 B1=20
50 B2=B1+10
60 T=24
80 REM
90 GET C$
100 IF C$=" " THEN S=S+1:IF S<2 THEN 90
101 S=0
120 IF C$=<>"1" AND C$<>"2" THEN 140
130 ON VAL(C$)GOSUB 220,230
140 IF (B1=T) OR (B2=T) THEN 400
150 PRINT TAB(B1);D$;TAB(T);"+";TAB(B2);D$
160 A=INT(RND(1)*5)+1
170 ON A GOSUB 200,210,210,210,200
180 ON B GOSUB 250,240
190 M=M+1:GOTO 80
200 B=1:RETURN
210 B=2:RETURN
220 T=T-1:RETURN
230 T=T+1:RETURN
240 GOSUB 350:RETURN
250 Y=INT(RND(1)*3)+1
260 IF X=Y THEN 250
270 X=Y
280 IF X=1 THEN D$="/"
290 IF X=2 THEN D$="I"
300 IF X=3 THEN D$="\"
310 GOSUB 350
320 RETURN
350 B1=B1+X-2
360 IF B1<1 THEN B1=1
370 B2=B1+10
380 IF B2>39 THEN B1=29:GOTO 370
390 RETURN
400 PRINT TAB(T);"*    CRASH!!!"
410 PRINT "YOU SCORED ";M; " POINTS."
420 M=0
430 FOR I=1 TO 500:NEXT I
460 GOTO 40
```

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CIRCLE 203 ON READER SERVICE CARD

Without TAB, continued...

between the second pair of quotes in line 152. The procedure is repeated once more for the right side of the road.

The keys N, M and space were used to move the car. Rather than "opening" the keyboard and using a GET command, memory location 764 (last keyboard key pressed) was used. If you PEEK this location, you'll find an entirely different character set code is used instead of the one detailed in the Atari manual. This code is read and converted for use in lines 120-129. Finally, line 140 checks whether the car has collided with the side of the road. If so, it branches to the end-of-race routine.

Once I had the program working properly, like most programmers, I could not resist the urge to improve and upgrade it. What better way than to make use of the built-in sound and color capabilities of the Atari. The sound of a race car was easy (line 154) since a distortion level of 2 in the SOUND statement gives a very realistic sound.

For the inevitable crash (Mario Andretti I'm not), I turned to the January 1981 issue of *Creative Computing* for a "percussive sound generator." Modifying the explosion routine slightly worked well (lines 403-408).

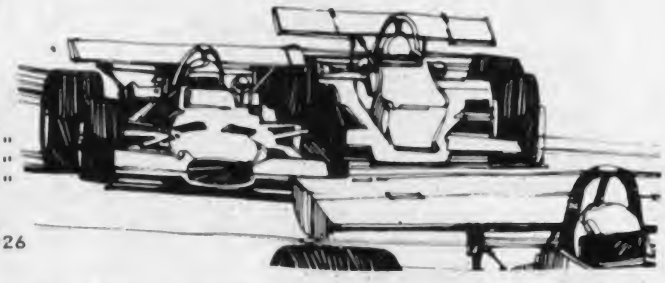
For the visual portion of the explosion, a simple rapid rotation of the screen colors was effective (lines 401-402). Note that the SETCOLOR had to be reset in line 402 to return the screen to the original color.

Finally I added a crude scoring system (lines 410-414) and a method of playing repetitively under player control. In line 420, location 764 had to be POKE with 255 otherwise the last direction key pressed, prior to a crash, would be printed after line 60 was executed.

If you get too good for the program, reduce B2 in line 40. Happy racing! □

Listing 2.

```
1 REM ATARI TRANSLATION BY FRED PINHO
2 REM FROM PET TRANSLATION BY D. LUBAR  AND R. FORSEN
3 ? "}"
5 DIM D$(1),A$(3)
10 POKE 752,1
20 S=0:M=0
40 B1=20:B2=B1+7:T=24
45 ? "       INDIANAPOLIS SPEED TRIALS"
50 ? "         SPEED DEMONS WANTED"
60 ? "   ARE YOU WILLING TO GIVE IT A TRY";:INPUT A$
70 IF A$<>"Y" AND A$<>"YES" THEN END
80 ? :? :? "PRESS N TO GO LEFT,M TO GO RIGHT,"
81 ? "AND SPACE TO GO STRAIGHT":FOR P=1 TO 2000:NEXT P
85 ? "}"
90 IF PEEK(764)=255 THEN S=S+1:IF S<2 THEN 90
100 S=0
120 IF PEEK(764)<>33 AND PEEK(764)<>35 AND PEEK(764)<>37 THEN 140
129 I=PEEK(764)-32
130 ON I GOSUB 235,235,220,220,230
140 IF B1>=T OR B2<=T THEN 400
150 POKE 201,B2:? " ",D$
152 J=PEEK(84):POKE 84,J-1:POKE 201,T:? " ","";
153 J=PEEK(84):POKE 84,J-1:POKE 201,B1:? " ",D$
154 SOUND 0,70,2,7
160 A=INT(5*RND(1))+1
170 GOSUB 250
190 M=M+1:GOTO 90
220 T=T-1:RETURN
230 T=T+1:RETURN
235 T=T:RETURN
250 X=INT(3*RND(1))+1
280 IF X=1 THEN D$="/"
290 IF X=2 THEN D$="|"
300 IF X=3 THEN D$="\"
350 B1=B1+X-2
360 IF B1<1 THEN B1=1
361 IF B1>26 THEN B1=26
370 B2=B1+7
390 RETURN
400 POKE 201,T:? "","*":? "CRASH!!!":SOUND 0,0,0,0
401 FOR K=1 TO 10:FOR I=1 TO 10:SETCOLOR 2,I,14:NEXT I:NEXT K
402 SETCOLOR 2,9,4
403 NTE=200:GOSUB 405:SOUND 1,0,0,0:SOUND 2,0,0,0
404 GOTO 410
405 SOUND 2,75,8,15:ICR=0.79+7/100:V1=15:V2=15:V3=15
406 SOUND 0,NTE,8,V1:SOUND 1,NTE+20,8,V2:SOUND 2,NTE+50,4,V3
407 V1=V1*ICR:V2=V2*(ICR+0.05):V3=V3*(ICR+0.08):IF V3>1 THEN 406
408 SOUND 0,0,0,0:RETURN
410 ? "YOU SCORED ";M;" POINTS."
411 IF M<=20 THEN ? "TRY AGAIN WITH A SLOWER CAR"
412 IF M>20 AND M<50 THEN ? "YOU'RE GETTING BETTER.KEEP PRACTICING!"
413 IF M>=50 AND M<80 THEN ? "YOU'RE A HOT ROD!"
414 IF M>=80 THEN ? "WOW!!! LET'S GO TO THE DRAG STRIP!!"
420 FOR I=1 TO 700:NEXT I:POKE 764,255
430 ? "}":GOTO 20
```



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CIRCLE 238 ON READER SERVICE CARD

A Formatting Lister for Basic Programs

Paul F. Doering

The submission of this program was greeted with great joy by the editors of Creative Computing. Coping with untidy line listings is one of our least favorite occupations. If all authors would use Mr. Doering's programming to list the programs they submit for publication, we would be a much happier lot, and we would be able to provide more legible listings for our readers.

Mr. Doering has thoughtfully provided suggestions for modifying the program for other machines, and we respectfully suggest that all prospective authors consider using an appropriate version on the programs they submit.

—EBS

The IBM Personal Computer, like most others, offers the LLIST command to dump a Basic program to a printer. "Dump" is the right word. Who can explain why so primitive an operation has survived this long without evoking a rebellion? Just look at the typical LLIST product in Listing 1.

What's wrong? The line numbers are unaligned. Character groups are split arbitrarily at the righthand margin, only to resume among the line numbers at the left. Comment lines are lost in the operating statements, even if festooned with garlands of asterisks. If the example were long enough, you would see the text continuing right across the page perforations, too. Considering that it has come from a machine as versatile as a computer, the LLIST output is shameful.

Listings serve two purposes, of which LLIST addresses only one. If you seek some errant digit, a character-by-character scan of your program will require an unadorned dump. We do need that capability.

The other purpose of a listing, though, is to communicate the logical flow of a program; and for this LLIST fails us. We need something better, something that throws up fewer barriers to comprehension. We need something that yields a work of prose, something that promotes understanding of the author's reasoning.

I have addressed that aspect with Lister, a program written for a cassette-based IBM PC, that honors the constraints of the physical line of the printer without doing violence to the internal structure of the Basic line itself. Listing 2 gives you an idea of what Lister can do.

The formatting lister is a program that accepts other programs as its data. Therefore, the program to be listed must be an ASCII file, a succession of untokenized

Paul F. Doering, 56 Elmore Road, Rochester, NY 14618.

Listing 1.

```
10 'This is a deliberately awful example of what the traditional LLIST command w
ill do to you, when all you want is a legible listing.
20 MAXIMUM.SIZE=20: DIM A$(MAXIMUM.SIZE), B$(MAXIMUM.SIZE), C$(MAXIMUM.SIZE), D$
(MAXIMUM.SIZE)
30 FOR INDX = 0 TO MAXIMUM.SIZE: A$(INDX)=INKEY$: IF A$(INDX)="P" GOTO 40 ELSE B
$(INDX)=A$(INDX): NEXT
40 'I think you get the point....
```

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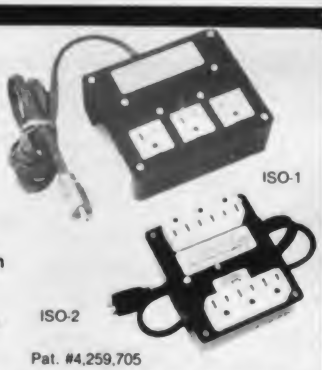

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CIRCLE 163 ON READER SERVICE CARD

strings. The IBM Personal Computer lets you save a program in either tokenized (SAVE "progname") or untokenized (SAVE "progname",a) form, so this restriction is unimportant.

Format Of The Listing

You determine the format of the listing at run time. The program expects to be *talking* to the standard IBM printer or an Epson MX-80, so the set of control codes can invoke the standard, the double-width standard, the compressed, and the double-width compressed fonts for maximum line lengths of 80, 40, 132, and 66 characters, respectively.

You can set the left and right margins almost anywhere on the page. The program will complain if the margin settings and line length are incompatible. A "bottom blanks" parameter lets you set the number of blank lines that will straddle the perforations in the paper.

Aligning the line numbers is so easy that you wonder why the feature isn't common.

Selecting single- or double-spacing is as easy as touching one key. You can also choose a descriptive phrase to be printed as a header adjacent to the page number at the top of each page of the listing.

Part of the length of Lister concerns actions governed by the ten programmable keys on the IBM keyboard. I have used these extensively to make format choices easier. There is something satisfying about the power of a single keystroke. The unscrolled line of function labels on the screen makes it practical to change key meanings dynamically. If you haven't experimented with the technique, maybe you will spot some tips in this program.

Aligning the line numbers is so easy that you wonder why the feature isn't common. It takes exactly one Basic statement. Since it inserts leading spaces, we do it before judging the suitability of the length of the line.

Programs don't need comments, but programmers do. A virtue of Lister is that it highlights your comment lines without taking up memory with attention-getting flags. You get an automatic blank line — not even a line number — ahead of any set of one or more comment lines. This simple feature breaks the program into paragraphs without costing you anything. The listing of Lister itself shows how this introduces some organization.

Listing 2. A horrible example cleaned up by "lister."

```
10 'This is a deliberately awful example of what the traditional
     LLIST command will do to you, when all you want is a
     legible listing.
20 MAXIMUM.SIZE=20:
      DIM A$(MAXIMUM.SIZE), B$(MAXIMUM.SIZE), C$(MAXIMUM.SIZE),
     D$(MAXIMUM.SIZE)
30 FOR INDX = 0 TO MAXIMUM.SIZE: A$(INDX)=INKEY$:
      IF A$(INDX)="P" GOTO 40 ELSE B$(INDX)=A$(INDX): NEXT

40 'I think you get the point....
```

Listing 3. Formatting "lister" for IBM cassette Basic programs.

```
10 ' lister, to list BASIC programs saved in .A format. 820222.2130
20 ON ERROR GOTO 0
30 SCREEN 0: KEY OFF: CLS: DEFINT A-Z
40 DIM PREFER$(20)
50 LINE INPUT"Today's date: "; TODAY$

60 ' Set initial parameters.
70 L.MGN=5: R.MGN=72: B.MGN=8: LN.SPA=1: PG.LEN=66: PG.WID=80: DBL.WID=20
80 FLNM$="": HEADER$="": INDENT$=SPACE$(8)

90 ' Initialize the printer, complain if it's off-line.
100 ON ERROR GOTO 1310
110 LPRINT CHR$(24); CHR$(127); CHR$(18);: WIDTH "lpt1:",80
120 ON ERROR GOTO 0

130 ' Define F-keys.
140 KEY 1,"Lt margin at :"
150 KEY 2,"Rt margin at :"
160 KEY 3,"Bottom blanks:"
170 KEY 4,"Width (max'm):"
180 KEY 5,"Single spaced"+CHR$(13)
190 KEY 6,"Double spaced"+CHR$(13)
200 KEY 7,"P'gram name: "
210 KEY 8,"Header: "
220 KEY 9,"Review"+CHR$(13)
230 KEY 10," Begin"
240 KEY ON: LOCATE 23,1

250 ' Call attention to F-keys.
260 ARROW$=STRING$(20,"-")
270 PRINT ARROW$;: COLOR 0,7
280 PRINT" Use F-keys to set the listing format ";: COLOR 7,0: PRINT ARROW$
290 RESTORE: FOR I=0 TO 9: READ FKEY$(I): NEXT
300 DATA Lt,Rt,Bo,Wi,Si,Do,P',He,Re," B"

310 ' Set up list of preferred breakpoints.
320 FOR IP = 0 TO 20: READ Z$: IF Z$<>"END" THEN PREFER$(IP)=Z$: NEXT IP
330 IP=IP-1
340 DATA " ELSE ", " THEN ", ": ", " PRINT"
350 DATA " IF ", "  '", " OR ", " AND ",  ";"
360 DATA "=", " ", "+", "*", ",", END

370 ' Loop for adjusting runtime parameters.
380 LINE INPUT Z$
390 FOR I=0 TO 9: IF LEFT$(Z$,2)=FKEY$(I) GOTO 400 ELSE NEXT: GOTO 380
400 ON I+1 GOTO 420,430,440,570,480,490,510,460,670,780

410 ' Margin-setting routines.
420 GOSUB 1370: L.MGN=NUMBA: GOTO 380
430 GOSUB 1370: R.MGN=NUMBA: GOTO 380
440 GOSUB 1370: B.MGN=NUMBA: GOTO 380
450 ' Establish page header.
460 HEADER$=MID$(Z$,9): GOTO 380

470 ' Single- or double-space output.
480 LN.SPA=1: GOTO 380
490 LN.SPA=2: GOTO 380

500 ' Get name of program to be listed.
510 FLNM$=MID$(Z$,13)
520 IF LEFT$(FLNM$,1)=" " THEN FLNM$=MID$(FLNM$,2): GOTO 520

530 ' If there's no header yet, fake it with the file name.
540 IF HEADER$="" THEN HEADER$=CHR$(34)+FLNM$+CHR$(34)
550 GOTO 380
```

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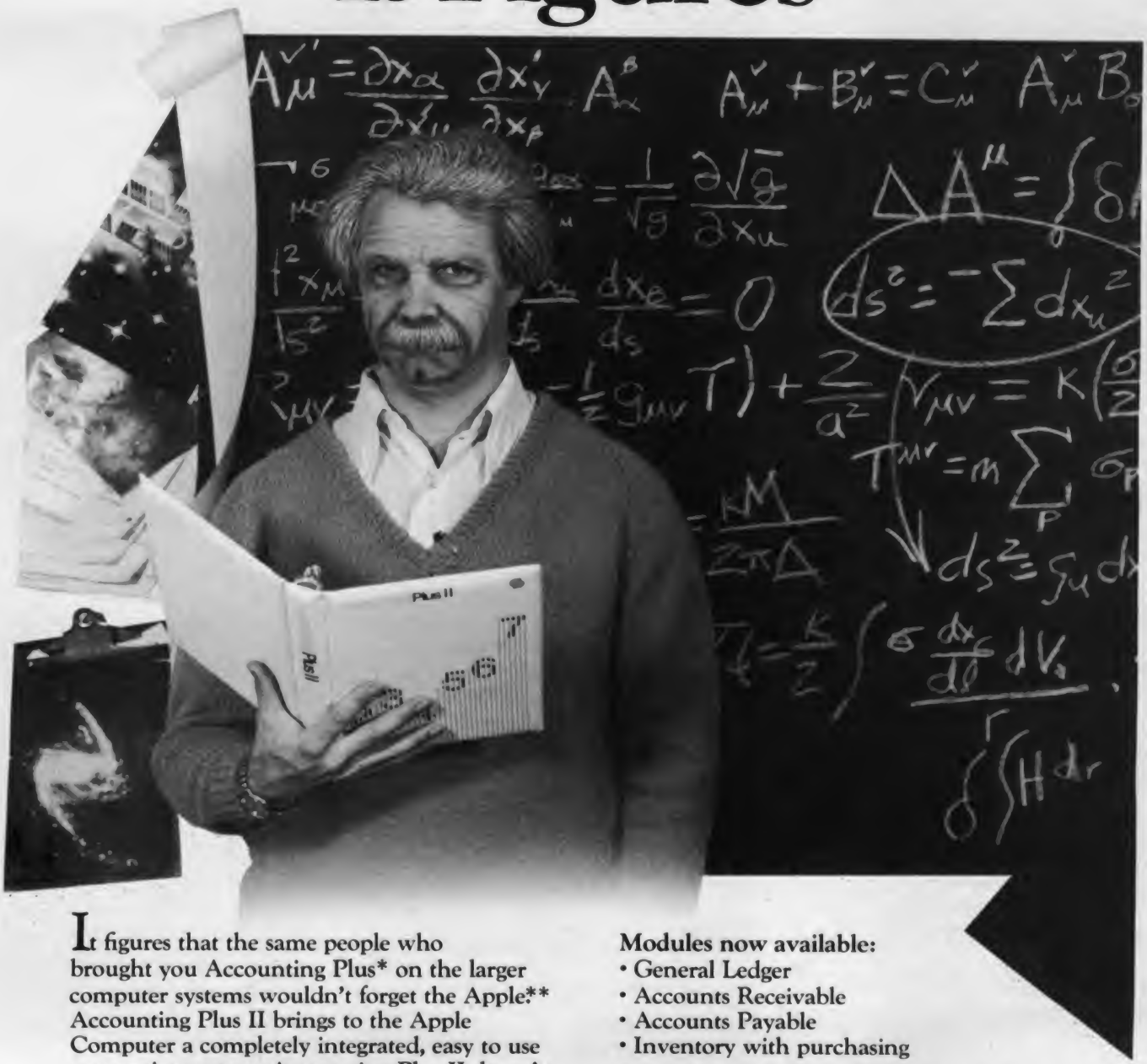

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CIRCLE 248 ON READER SERVICE CARD

Lister, continued...

Splitting Lines

The formatting lister earns its name when a program line won't fit on the printed page intact. It tries to identify a sensible place to split the line, in the hope that the result will be readable without strain or confusion. The key to the plan is a string array called PREFER$, which contains a set of words and characters apt to represent plausible breakpoints. This set is arranged in order of decreasing preference.

The scheme is simple. Using the INSTR function, the program seeks the rightmost occurrence of one of the elements of PREFER$ within an acceptable portion of the oversize line. Finding a match, it stores everything to its left in a buffer and checks the length of the remaining righthand segment. This cycle repeats until the offending line has been neatly sectioned.

Since the pending line resides in a buffer, Lister knows whether the line will fit on the current page. No line is split across a page boundary; that would make it harder to understand.

None of the specifications and principles I have discussed here is novel, but together they make a program listing clearer. That is a nice goal. If you want to modify Lister for a different computer, here are some considerations.

Modification For Other Computers

The IBM version of Basic requires that keywords be set apart from other text by delimiters; usually these are spaces. Many other Basics allow (or force) compression to squeeze spaces out, conserving memory at a double cost. Legibility suffers, and keywords must not be embedded inadvertently in variable names. SCORE, for example, becomes invalid by reason of the buried OR.

This trait complicates the conversion of the program. The array of plausible breakpoints, PREFER$, has several keywords (ELSE, THEN, PRINT, IF, OR, AND) to which the bounding spaces are important. Omit them, and the program will split variable names such as NIELSEN and CANDOR.

Another sacrifice involves the function keys. You can substitute control codes pretty successfully, but you must provide a reminder of their meanings.

The entire section on font choice may need to be re-done, if you don't have an MX-80.

Incidentally, IBM users, don't omit line 50. There is a bug in IBM Basic that won't allow you to change the string for key 2 without first executing a keyboard input statement. Temporarily convert line 50 to a comment, then start the program by hitting the RUN function key to see the bug in action. If you know a fix that doesn't demand user action, please write to me. □

```
560 ' Pass max-page-width parameter to the MX80 printer.
570 GOSUB 1370
580 IF NUMBA>132 THEN PRINT"Maximum page width is limited to 132 characters": GOTO 380
590 IF NUMBA>80 AND NUMBA<133 THEN LPRINT CHR$(20); CHR$(15);: WIDTH "lpt1:",132 ELSE WIDTH "lpt1:",80
600 IF NUMBA>66 AND NUMBA<81 THEN LPRINT CHR$(18); CHR$(20);
610 DBL.WID=20
620 IF NUMBA>40 AND NUMBA<67 THEN LPRINT CHR$(15);: DBL.WID=14
630 IF NUMBA<41 THEN LPRINT CHR$(18);: DBL.WID=14
640 PG.WID=NUMBA
650 GOTO 380

660 ' Display the current parameters.
670 PRINT: PRINT"Left margin at";L.MGN
680 PRINT"Right margin at";R.MGN
690 PRINT MID$(STR$(B.MGN),2);" blank lines at page bottom
700 PRINT"Maximum page width is";PG.WID
710 IF LN.SPA=2 THEN PRINT"Double"; ELSE PRINT "Single";
720 PRINT " line spacing"
730 PRINT"Program name: ";: IF FLNM$="" THEN GOSUB 1410 ELSE PRINT FLNM$
740 PRINT"Header: ";: IF HEADER$="" THEN GOSUB 1410 ELSE PRINT HEADER$
750 PRINT
760 GOTO 380

770 ' Check parameters before actually trying to list the program.
780 LN.LEN=R.MGN-L.MGN+1:
      IF L.MGN<1 OR L.MGN>R.MGN-20 OR R.MGN<L.MGN+20 OR R.MGN>PG.WID-2 OR B.MGN<5 OR PG.WID<LN.LEN
     OR LEN(HEADER$)>LN.LEN-10
     THEN BEEP: PRINT"CAN'T BEGIN. CHECK THE MARGIN & WIDTH SPECIFICATIONS or LENGTH OF HEADER": GOTO 270
790 FLNM$="cas1:"+FLNM$

800 ' Open the cassette file, complain if not possible to do it.
810 ON ERROR GOTO 1340
820 OPEN FLNM$ FOR INPUT AS #1
830 ON ERROR GOTO 0
840 LPRINT

850 ' Title the first page with the header and -if available- the date.
860 LPRINT CHR$(DBL.WID); TAB(L.MGN); HEADER$;: IF TODAY$="" THEN LPRINT ELSE LPRINT", listed "; TODAY$
870 LPRINT: LPRINT

880 ' Format the header to appear at upper right on later pages.
890 HEADER$=SPACE$(LN.LEN-LEN(HEADER$)-10)+HEADER$

900 ' Get the next BASIC line, quit if end of file.
910 PG.NUM=1: LN.CNT=4
920 IF EOF(1) GOTO 1430
930 LINE INPUT #1, TAPE$: IF TAPE$="" GOTO 930

940 ' Right-justify the line number.
950 TAPE$=SPACE$(6-INSTR(TAPE$," "))+TAPE$

960 ' CMNT.SW governs the blank line ahead of comment lines.
970 IF MID$(TAPE$,7,1)<>"'" THEN CMNT.SW=0

980 ' Break the BASIC line into printer lines.
990 FOR J=0 TO 9
1000 IF CMNT.SW=0 AND MID$(TAPE$,7,1)="'" THEN LN$(J)="": J=J+1: CMNT.SW=1

1010 ' It's easy if the whole line fits at once.
1020 IF LEN(TAPE$)<=LN.LEN THEN LN$(J)=TAPE$: GOTO 1180

1030 ' Else, check for preferred breakpoints.
1040 FOR K=0 TO IP
1050 SITE=0: K$=PREFER$(K)
1060 HI.SITE=SITE: IF SITE<9 THEN SITE=9
1070 SITE=INSTR(SITE+1,TAPE$,K$)
1080 IF SITE>0 AND SITE<=LN.LEN GOTO 1060
1090 IF HI.SITE=0 THEN NEXT K
1100 IF HI.SITE=0 THEN HI.SITE=LN.LEN

1110 ' HI.SITE now points to the rightmost, best breakpoint.
1120 ' Split the line there and indent all but the first one.
1130 LN$(J)=LEFT$(TAPE$,HI.SITE)
1140 TAPE$=MID$(TAPE$,HI.SITE+1)
1150 TAPE$=INDENT$+TAPE$
1160 NEXT J

1170 ' Will the pack of printer lines fit on this page?
1180 IF LN.CNT<PG.LEN-B.MGN-LN.SPA$(J+1) GOTO 1250
```

```
1190 ' No, so begin a new one, complete with header & page number.
1200 PG.NUM=PG.NUM+1
1210 LPRINT CHR$(12)
1220 LPRINT CHR$(DBL.WID); TAB(L.MGN); HEADER$;", page";PG.NUM
1230 LPRINT: LPRINT: LN.CNT=4

1240 ' Everything is guaranteed to fit. Print it all.
1250 FOR L=0 TO J: LPRINT CHR$(DBL.WID); TAB(L.MGN); LN$(L): IF LN.SPA=2 THEN LPRINT
1260 NEXT L

1270 ' Update the line count for this page, and cycle again
1280 LN.CNT=LN.CNT+(J+1)*LN.SPA
1290 GOTO 920

1300 ' The operator-alert for an off-line printer:
1310 PRINT: BEEP: PRINT"The line printer isn't ready. Check it....": PRINT
1320 RESUME 110

1330 ' The operator-alert for a lack of cassette data:
1340 CLOSE: PRINT: BEEP: PRINT"Problem with the cassette. Check it..."
1350 RESUME 820

1360 ' Subr to decode a numeric parameter input.
1370 NUMBA=VAL(MID$(Z$,15))
1380 IF NUMBA=0 THEN BEEP: PRINT"<< NUMBER REQUIRED >>"
1390 RETURN

1400 ' Subr to note the lack of a file name or header.
1410 COLOR 0,7: PRINT"  NONE SPECIFIED  ";: COLOR 7,0: PRINT: RETURN

1420 ' Orderly exit. Reset the printer & F-keys, then exit.
1430 LPRINT CHR$(18); CHR$(20): WIDTH "lpt1:",80: BEEP: CLOSE: KEY OFF
1440 KEY 1,"List ": KEY 2,"Run"+CHR$(13): KEY 3,"Load"+CHR$(34): KEY 4,"Save"+CHR$(34): KEY 5,"Edit ":
     KEY 6,CHR$(34)+",a"
1450 KEY 7,"Lprint"+CHR$(13): KEY 8,"Cls"+CHR$(13): KEY 9,"": KEY 10,"Screen 0,0,0"+CHR$(13)
1460 KEY ON: END
```


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In 1956, Jack Finney wrote a short science fiction story entitled "Cousin Len's Wonderful Adjective Cellar." It was published by Rinehart in a collection called "The Third Level," and was about a writer who happened upon an amazing saltcellar.

Unlike its tabletop counterpart, however, the adjective cellar would sweep up all extraneous adjectives from a manuscript page and store them as a heap of colorful bits. (They could be sprinkled onto dry writing to add sparkle.)

A word processing program or machine is an early electronic version of Cousin Len's wonderful machine. It can help you "sweep in" better style by "sweeping out" misused words and overused punctuation.

You can do this because every word processing system, whether dedicated or on a personal computer, has a Search function to find any "string" of one or more letters and/or numbers you specify. For example, if you want to change Smyth to Smith, you can find every occurrence of Smyth and correct it.

I used the Third Edition of Strunk and White's *The Elements of Style* (MacMillan Publishing Co., New York) to set the framework for this column. Any good work on grammar, however, would serve as well.

Here are just a few ways a word processor can help you write better prose:

A very common mistake is to confuse "its" and "it's." One is possessive, the other a contraction of "it is." Search for "it." You'll find words such as "with" and "writing"—any word with the "it" string inside it—but you can skip those and correct the others.

Dale Archibald, 1817 Third Ave. N., Minneapolis, MN 55405.

Note: Some Search functions can't find words beginning with capital letters. If you look for "men" and it begins a sentence, it will be ignored. To prevent this, you might Search for the last characters in the word, e.g. "en."

White says statements should be positive. Use the Search function to delete "not" from your sentences unless you are making a direct denial. That is, instead of writing "John is not nice," write "John is a jerk."

Remove "the fact that," "who is" and "which was."

Prevent paragraphs from degenerating into a series of what White calls "loose sentences." Search for instances of ", and" or ", but". Other weak comma links that require frequent attention are a comma with who, which, when, while and where. If you've linked too many of these together in your writing, change them.

The Search function can also help you keep to one tense. If you are writing about a person in the present tense, for example, check to be certain you alway write "says" rather than "said."

The Search function can help detect overuse of exclamation points and hyphens. It can also help you standardize hyphenation and usage. That is, if you are "feather-headed" at one place in the document, don't be "feather-headed" in another.

Writers have a tendency to develop pet words and phrases, such as those listed in *Elements of Style* under "Words and Expressions Commonly Misused." After a time, you'll use them wherever they may—almost—fit. Read through what you have written: those repeaters will jump out at you. Put them on your Search list for removal.

White warns against tacking "ize" (to make a noun into a verb), "oriented," and "wise" at the ends of words.

You can even go "which-hunting" as White suggests. (This, one instructor of beginning composition informs me, is the most misused word he sees.) "Which" is used, too often, in place of "that." "That" is a restrictive pronoun, and refers to a particular noun. On the other hand, "which" is nonrestrictive, and a parenthetical phrase beginning with it should almost always be set off by commas.

Other strings I would add to the list to be examined are "ly" and "eous." You can eradicate your own favorite adverb endings as you become a more proficient writer.

Keep away from adverbs (and, of course, adjectives) as much as possible. White says you should write with nouns and verbs.

If you like, you can check your "ie" and "ei" words, "i before e except after c" isn't always true. See feint and feign.

Writing is hard work, and owning the world's finest word processing program or machine won't transform you into a second Shakespeare. It will, however, let you search out some of the most common problems with your writing. You can then change or strengthen weak spots.

The wrong choice of words clutters and clogs writing, slows it to a trickle (and sometimes turns it purple). Careful editing leads to good writing, be it a novel, short story, magazine article, school report, or business letter. □

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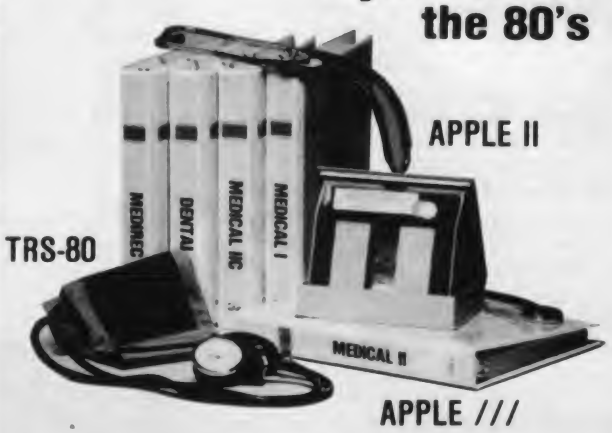

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CIRCLE 126 ON READER SERVICE CARD

outpost: atari

David and Sandy Small

Continuing the discussion of DOS menu options that we began in the August column:

F. Lock file. A file that is locked may not be altered or deleted. This is a safety feature; I lock the editor and assembler files on my disks that have them. This prevents something like a wildcard delete from destroying them or something in DOS from accidentally modifying or destroying them.

G. Unlock file. The reverse of F.

H. Write DOS files. This option writes DOS.SYS and DUP.SYS on the current disk. (You are asked which drive number to write the files to.) Remember, you must have the DOS files on a disk to be able to power up using that disk, for the disk operating system must load at that time.

I generally use this option after modifying DOS (let's say with the "fast write" POKE) or after formatting a disk. By the way, old DOS files on the disk will be deleted. And in answer to a question I received, the DOS files do not need to be any place in particular on the disk. They can be put in any time.

I. Format disk. This option takes a new or used disk and completely blanks it out, putting "formatting information" onto the disk. It also sets up a blank directory and other information needed by the Atari to access the disk. And here we go on a short detour:

Fast Format Chips

A disk is laid out with the sectors in which data is saved in a particular order. As the disk spins at 290 rpm these sectors are accessed one by one. Now, depending on how the sectors are laid out, the Atari can access them more quickly. Atari has two popular sector layouts—the B and C layouts. The B layout is the original and is quite slow; there is a discernible pause between disk reads (beep—pause—beep—pause—beep, where each beep is one read.)

The C format is about 20% quicker than the B format, because the disk is laid out more efficiently. Disks that come from Atari use the C layout.

When you format a disk, the way your disk was set up at the factory determines whether it uses the B or C layout. Most drives today have the B layout, but all new drives shipped from Atari have the C layout. Thus, disks formatted on new drives (using the C layout) will do everything 20% more quickly than disks formatted on B drives.

By the way, if you reformat a disk, the new format will be the one laid out by your disk drive, so don't reformat Atari-formatted disks. Instead, if you want to delete old infomation from them, use Delete *.*.

A group of users in Chicago modified the B layout to what is called the Chicago layout. This layout is 30% quicker than the B format and indeed is 10% quicker than Atari's own C layout. However, a price is paid: the disks become rather sensitive.

Atari disk drives have difficulty maintaining a given rpm, which causes several problems, including lots of read-write errors. If you install the Chicago format, and your disk spins at more than 288 rpm, it will skip sectors, doing a complete spin between reads. This is quite slow and has a distinctive "Beepbeepbeep (pause) beepbeepbeep (pause)" sound. If you get this, check your disk.

One other thing about the Chicago chips is that they may be illegal. Atari copyrighted the B format in the ROMs used in the drive. It would annoy them considerably if users didn't buy the new C chips, complete with installation charge, but used the Chicago chips instead.

The legal question about copying the chips, then modifying them, is not one I would care to test. Yet many users have installed Chicago chips in their drives, and some groups even hold swap parties where hardware experts install Chicago chips into other people's drives. Someone with pretty good hardware knowledge and an EPROM copier is needed even to make the Chicago chips from the available instructions (which have shown up in many newsletters), so this choice may not even be available to you.

Yet another consideration is that the difference between the B and C chips available from Atari does not consist solely of the formatting change. The chips are much different, and supposedly other improvements have been incorporated into the C revision. You may be missing out on these improvements if you install a Chicago chip.

Another goodie installed by Atari on later drives is a piece of hardware called a "data separator." The story is this: Atari uses a floppy disk controller chip from Western Digital called the 1771. The 1771 is a fine chip, but has a weakness in clarifying data read from the disk, a process called data separation. Even the manufacturer's own literature tells the user not to rely on the internal data separation of the chip.

So what did Atari do? They didn't use an external separator. Result: bad disk reliability and lots of errors. Soon the more sophisticated users of Atari drives figured out the problem and began installing TRS-80 data separators in their Atari drives.

It seems that the makers of the TRS-80 had done the same thing (not used an

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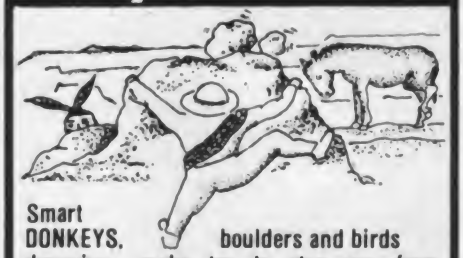

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CIRCLE 221 ON READER SERVICE CARD

external separator) and that TRS-80 disks had very poor reliability as a result. So outside companies began supplying data separators for the TRS-80. Since this machine also used the 1771 controller, the data separators for the TRS-80 fit the Atari.

I installed one some time ago and have been very pleased with the increase in reliability. The cost is $29.95 from one source, Percom, which now supplies kits for the Atari.

You need a soldering iron for two very minor solder touchups and a phillips head screwdriver to remove the cover of the machine. While the modification will violate the Atari warranty, it is worth it.

I recommend it to anyone who doesn't have the Atari data separator, which is everyone with a drive made before January 1, 1982. Percom can be reached at (214) 340-7081. You should call for new pricing and availability information.

Depending on your local dealer, parts availability, and other factors, you may be eligible for a deal whereby you send your drive in for installation of a C formatting chip and an Atari data separator and a general check-up. The Atari separator seems to be pretty good, so you may want to look into this option to upgrade your drive.

A late breaking rumor is that Atari has released yet another add-on board to help control the drive. I don't know whether this is true, but it sounds likely; drive rpm has caused many headaches.

DOS Menu Again

J. Duplicate Disk. (I know, you thought I'd never get back to the DOS menu. Right?) This option allows you to duplicate an Atari disk completely. What it does is read each sector from 1 to 720.

The user can either duplicate from drive to drive or with one drive by swapping disks. Use "1,1" at the prompt to duplicate a disk with one drive, and differing numbers to duplicate between drives.

Duplicate Disk is more or less identical to a copy using *.*. However, the disk duplication is complete, so errors in the disk will also be duplicated. Should you get an ERROR 14 or 164 on the disk, Duplicate Disk may not work, and you should copy individual files from disk to disk to recover what can be recovered. A discussion of sector chaining and what causes an Error 164 is beyond the scope of this article, but can be found in the April and May 1982 issues.

K. Binary Save. This is an option for the advanced user which saves a given area of memory to disk as a binary file. It is an assembly language entity used by the machine. Since this is a beginner's guide, and hexadecimal input is required, I'll leave it at that. See the DOS 2 manual for a lengthy, painful disussion of what happens.

L. Binary Load. This is an option to load a binary file from disk into memory and to execute it directly. Beginners may use it, although they may not understand what is going on. The Macro-Assembler/Editor is only accessible by loading it from a binary file, for instance. And Microsoft Basic is just another binary load file. (Think of a cartridge as a binary load frozen into the cartridge which appears in memory when you plug the cartridge in, and a disk load as data that appears in memory loaded from disk. This will give you an idea as to how the two relate.) And no, you can't copy a cartridge using the Binary Save option—Atari DOS checks for this to prevent people pirating the cartridges.

M. Run at address. Again, this is an advanced-user-only option. It enables DOS to jump directly into a program loaded in memory. It is handy for advanced users who want to run programs without a cartridge, but not so helpful for beginners. Again, knowledge of hexadecimal is required.

N. Create MEM.SAV. This is used to create the initial MEM.SAV file. To eliminate it, use the Delete option. You cannot create MEM.SAV any other way, although a disk that is Duplicated will have the MEM.SAV on the new copy if the FROM disk had it.

O. Duplicate file. This is used to copy a file from one disk to another without using two drives. Wildcards can be used to copy an entire disk.

Disk drives are relatively high-speed mass storage devices. Alas, the 5 1/4" mechanisms represent a tradeoff between reliability and cost. The 8" drives, which are more reliable, also cost much, much more. Atari probably couldn't market an 8" drive for less than $900; so they went with the 5 1/4" mechanism and enabled many more to have disk drives. It was a good tradeoff.

Unfortunately, the way in which Atari designed their drives is developing into a controversy. The number one topic of conversation in many user's groups seems to be peeves about Atari disk drives. The drives are neither reliable nor fast—even compared to the rest of the industry. Apple disk drives, for example, run up to 20 times faster.

Something will undoubtedly be done; Atari has not been deaf to the complaints. For the moment, they have issued several patches to the drives—data separators, rpm fixes—but they may not be able to correct what might be simply a bad design.

See you next time! □

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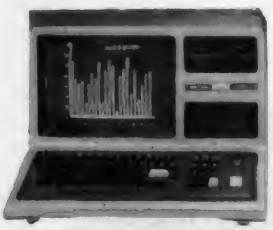

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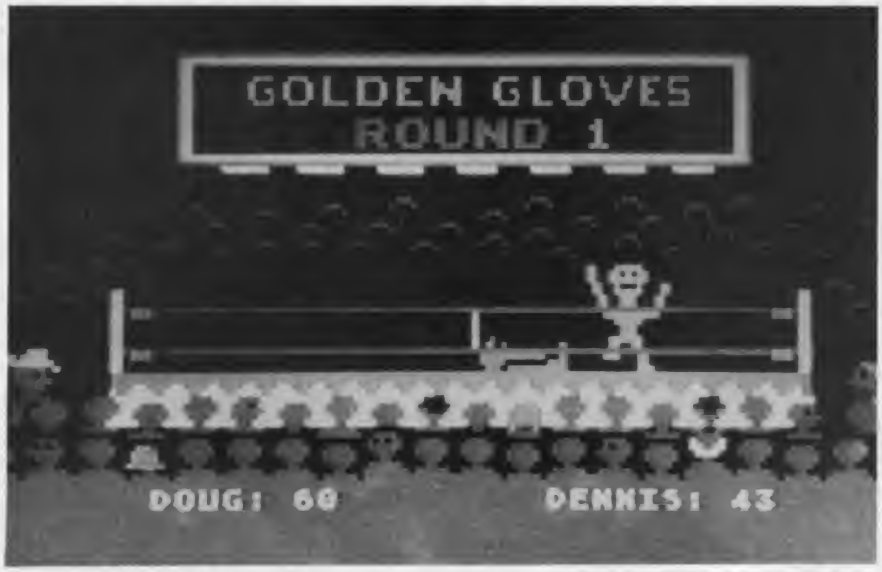

Scene from GOLDEN GLOVES

HODGE PODGE: by Marsha Meredith (Atari and Apple)

NOW AVAILABLE FOR ATARI!!! This captivating program is a marvelous learning device for children from 18 months to 6 years. HODGE PODGE consists of many cartoons, animation and songs which appear when any key on the computer is depressed. A must for any family containing young children.
PRICE . . . . . **$19.95** diskette

☐ **PM EDITOR:** by Dennis Zander (Atari, 16K)
Create your own fast action graphics game for the Atari 400 or 800 using its player missile graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (PO$(Y)=SHIP4). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in **ARTWORX** RINGS OF THE EMPIRE and ENCOUNTER AT QUESTAR IV.
PRICE **$29.95** cassette **$33.95** diskette

☐ **ROCKET RAIDERS** by Richard Petersen (Atari 24K)
Defend your asteroid base against pulsar bombs, rockets, lasers, and the dreaded "stealth saucer" as aliens attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures.
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☐ **FOREST FIRE TWO:** by Richard Petersen (Atari 24K)
FOREST FIRE has been enhanced and now offers a two player mode for head to head competition to see who can survive, suffer the least damage and put their fire out first. User input now determines landscape, wind and weather conditions, offering limitless game variation. FOREST FIRE's excellent color graphics have been made even better, turning your computer into a super-detailed fire scanner.
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☐ **FORM LETTER SYSTEM:** (Atari, North Star and Apple)
This is the ideal program for creating personalized form letters! FLS employs a simple-to-use text editor for producing fully justified letters. Addresses are stored in a separate file and are automatically inserted into your form letter along with a personalized salutation. Both letter files and address files are compatible with **ARTWORX** MAIL LIST 3.0 and TEXT EDITOR programs.
PRICE . . . . . **$39.95** diskette

☐ **THE PREDICTOR** by Thomas Barker (Apple, Atari, TRS-80, North Star and CP/M (M-BASIC)
This is a complete package that covers least squares fitting of parameters for two or more variables. THE PREDICTOR can be used for predicting sales and process behavior, trend analysis, model building and many other uses calling for multilinear regression techniques. Each option in the program is prompted with simple YES/NO commands making it **very** easy to use.
PRICE **$29.95** diskette

☐ **PILOT:** by Michael Piro (Atari, 16K)
Pilot your small airplane to a successful landing using both joysticks to control throttle and attack angle. PILOT produces a true perspective rendition of the runway, which is constantly changing. Select from two levels of pilot proficiency.
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☐ **TEXT EDITOR:** (Atari and North Star)
This program is very "user friendly" yet employs all essential features needed for serious text editing with minimal memory requirements. Features include common sense operation, two different justification techniques, automatic line centering and straightforward text merging and manipulation. TEXT EDITOR files are compatible with **ARTWORX** FORM LETTER SYSTEM.
PRICE . . . . . **$39.95** diskette

☐ **MAIL LIST 3.0:** (Atari, Apple and North Star)
The very popular MAIL LIST 2.2 has now been upgraded. Version 3.0 offers enhanced editing capabilities to complement the many other features which have made this program so popular. MAIL LIST is unique in its ability to store a maximum number of addresses on one diskette (typically between 1200 and 2500 names!). Entries can be retrieved by name, keyword(s) or by zip codes. They can be written to a printer or to another file for complete file management. The program produces 1, 2 or 3-up address labels and will sort by zip code (5 or 9 digits) or alphabetically (by last name). Files are easily merged and MAIL LIST will even find and delete duplicate entries! The address files created with MAIL LIST are completely compatible with **ARTWORX** FORM LETTER SYSTEM.
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☐ **THE VAULTS OF ZURICH:** by Felix and Greg Herlihy (Atari, 24K, PET)
Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: THE OPEC OIL DEEDS!
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☐ **BRIDGE 2.0** by Arthur Walsh (Atari (24K), Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems)
Rated #1 by Creative Computing, BRIDGE 2.0 is the only program that allows you to both bid for the contract and play out the hand (on defense or offense!). Interesting hands may be replayed using the "duplicate" bridge feature. This is certainly an ideal way to finally learn to play bridge or to get into a game when no other (human) players are available.
PRICE . . . . . **$17.95** cassette **$21.95** diskette

☐ **ENCOUNTER AT QUESTAR IV:** by Douglas McFarland (Atari, 24K)
As helmsman of Rikar starship, you must defend Questar Sector IV from the dreaded Zentarians. Using your plasma beam, hyperspace engines and wits to avoid Zentarian mines and death phasers, you struggle to stay alive. This BASIC/Assembly level program has super sound, full player missile graphics and real time action.
PRICE . . . . . **$21.95** cassette **$25.95** diskette

NEW PROGRAMS!

GOLDEN GLOVES: by Douglas Evans (Atari 24K)
Use your joystick to jab, block and duck as each player attempts to land the knockout punch. This unique real-time program brings all of the excitement of ringside to your Atari. GOLDEN GLOVES is a one or two-player game, or you can be a spectator as the computer controls both fighters.
PRICE . . . . . **$22.95** cassette **$26.95** diskette

CRAZITACK: by Peter Adams (Atari 16K)
The Crazies are attacking us and the only defenses are three MX bases. Missiles can be launched singly or in a salvo, but it is doomsday when you run out of missiles.
PRICE . . . . . **$17.95** cassette **$21.95** diskette

DOMINATION: by Alan Newman (Atari 24K)
Between one and six players compete for power via economic, diplomatic and military means in this award-winning game. You must make decisions quickly, exercise skillful hand-eye coordination, outguess your opponents and cope with random events.
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POKER TOURNEY: by Edward Grau (Atari 32K, Northstar)
You are entered in a high stakes Draw Poker Tournament facing six opponents including Lakewood Louie, Shifty Pete and Dapper Dan. Each has his own style of play and of bluffing. POKER TOURNEY utilizes the Joker, has true table stakes play and each hand is played based on pot odds. The Atari version's graphics and sound are superb of course (programmed by Jerry White) making POKER TOURNEY the class program of its type.
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HAZARD RUN: by Dennis Zander (Atari, 16K)
The sheriff has spotted you and you must make the treacherous run through Crooked Canyon past Bryan's Pond to the jump at Hazard Creek and safety. You can even put the joystick-controlled GEE LEE car up on two wheels to make it through some tight spots. A lead foot is not always the answer as you dodge trees, rocks and chickens in this nerve-racking game. HAZARD RUN employs full use of player/missile graphics, re-defined characters and fine scrolling techniques to provide loads of fast action and visual excitement.
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IBM Press Release
August 12, 1981

NEW YORK—International Business Machines Corp. has made its bold entry into the personal-computer market, and experts believe the computer giant could capture the lead in the youthful industry within two years.
Yesterday the company introduced several versions of a small computer....

The Wall Street Journal
August 13, 1981

The International Business Machines Corporation, the giant of the computer industry, is thinking smaller: Yesterday it introduced a personal desk-top computer for use at home, in schools and in business.
Although the announcement had been expected for months....

The New York Times
August 13, 1981

So the IBM Personal Computer is a year old. Well, *my* IBM Personal Computer isn't a year old, but I think I've already told that story. To celebrate, I have cooked up something special.

There is one burning question I just can't seem to get a handle on: How many PCs have been sold? And what do they look like?

Last month I mentioned some guesstimates, but I'm not satisfied with the data yet. So I've decided to bite the bullet and do my own survey, which is included in this column. Here's the deal. You fill out the survey (PC owners only, please!), and I'll do the dirty work and report back as soon as I can. I make no claim that my results will be perfectly statistically valid, but they are sure to be interesting.

W. H. Fastie, 7110 Sheffield Road, Baltimore, MD 21212. Correspondence can only be acknowledged when a stamped self-addressed envelope has been provided. Source address: TCP394.

Mail your completed survey to me at the address shown below. Please mark the envelope SURVEY. Please don't include other correspondence with the survey submission—I'm not necessarily going to open these things right away. Deadline for submission is September 30, 1982; surveys received after that date will not be included in the tally.

If I end up with 10,000 surveys, I guess I'll find out how many good friends I really have.

IBM Announcements

I was going to spend some time this month griping about the limited capacity of my disks. One of the things IBM announced this month makes that complaint ring hollow, although I guess I could still complain about *my* disks—they're still small!

A very significant announcement was for disk drives of increased storage capacity. The new disks are double-density, double-sided, and will allow 320,000 bytes to be stored on one diskette. With these drives, the storage capacity of the IBM Personal Computer is doubled, and although I would prefer at least 500,000 byte disks, the new size allows considerably more flexibility. The new disks retail for $650 from IBM. At the same time, IBM reduced the price of the 160K drive from $570 to $450.

The new disk prices are still not competitive with the general market. The single-sided disk is usually available for under $300 (e.g., the Tandon model 100-1) and has been advertised as low as $269. Double-sided drives (e.g. the Tandon model 100-2) usually cost about $325, and my friend Tom just bought a pair for $299 each. Once again, it appears that IBM is twice the price.

Accompanying this was the announcement of a new version of IBM DOS.

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Warren Rosenkranz, President, VR Data

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IBM, continued...

Version 1.1 of DOS includes support for both the old and new disks, which can be mixed on a system. Enhancements include a speedup of the reading and writing of diskettes and the ability to direct parallel printer output to a serial printer. Also included is Basic version 1.05, which has the now-famous bug repaired. It costs $40, and I gather that it will now be the standard issue.

I have only seen a list of enhancements so far, as opposed to trying them out, but the improvements are very nice and much needed. One very important point is that 160K diskettes can be read in the larger drive, because the information regarding the disk format is stored on the disk itself. That means you can upgrade and still use single-sided media.

The most significant of the announcements concerned the printer. The same printer which sold for $755 will now sell for $555. Although an Epson MX-80 can be purchased for under $500, the new IBM price is much more competitive and reasonable. The printer, I'm told, will be exactly the same as the current machine. This means it will not include the Graftrax-Plus option recently announced by Epson.

I'm happy to see the price reduction, but I regret that IBM has not seen fit to provide the graphics option with the printer, or to provide a character set which exactly matches the complete character set of the display.

There were three software announcements. Most important is the Microsoft Basic compiler, for $300. The program processes a Basic program and produces a version which can run considerably faster. Because the most common complaint about systems written with Basic is performance, this announcement will be of great interest to software developers. The other two packages are from BPI: Inventory Control and Accounts/Receivable, both $425.

In other announcements, IBM added retailers to their distribution network, a list of which appears in Table 1, and changed the software submission plan. The changes in software submission include the elimination of the royalty ceiling and revisions in the agreements. However, the royalty terms are no longer

Table 1. New Authorized IBM Personal Computer Dealers.

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Entre Computer Centers	McLean, VA
Frederick Computer Products	Frederick, MD
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fixed at 15% but are negotiated individually. I certainly feel that these changes represent an improvement, but until I see the new agreements I will have to reserve judgment. There is still a two-step procedure involving a "simplified" submission agreement. The original submission agreement was too restrictive, in my opinion.

Programs

I've included a couple of programs that might be of interest. Listing 1 is a "lander" program written by my friend Rich. It is a very simple-minded game, the object of which is to land the plus sign in the goal at the bottom. A reasonable terminal velocity is required. The game has no error checking, and so aborts if the "ship" goes off either side or the top. Thrust is applied by pressing the arrow keys on the cursor keypad, resulting in the application of thrust such that the ship moves in the direction of the arrow pressed.

I provide this game because it illustrates several good points. First, the game is rather entertaining. The office staff enjoyed it, and my secretary almost wore out the machine playing it. Second, the program is relatively short given the problem, attesting to the power of this Basic. Finally, the performance is more than acceptable. I would have never thought to write the program, simply because I would not have believed it would be fast enough.

Here are some challenges: 1) Fix the program to either a) crash against the top and sides or b) bump off of them. 2) Modify the program to show the rockets thrusting. 3) Modify the program to include obstacles, or to move the terrain below if the ship moves off to either side. (Note: the answers are *not* available from me!)

The second program, shown in Listing 2, is provided to demonstrate a technique that may be of use to software developers. An irritation of mine is that the keyboard has nothing to indicate which state the keypad is in. This program can actually change the state of the pad from numeric to cursor control or vice versa.

For demonstration purposes, I have written the program so that it announces the code for any key depressed, and switches the keypad whenever the plus sign (+) is depressed. The technique illustrated can be used by a program to force the keypad into a particular state. The information I needed to devise this program was found in the Technical Reference Manual in the BIOS listing.

Games— (Mini-Reviews)

As you may remember, I have been languishing waiting for games. This month, things finally broke loose.

Listing 1a. Lander Game Using Graphics (Color Board required).

LANDERC

```
100 'LANDER by Richard Foard
110 'requires BASICA, Color/Graphics Adapater; assumes C/GA engaged!
120 'use cursor control keys to move ship
130 KEY OFF: CLS: SCREEN 1
140 DIM CUR%(20)
150 GOSUB 430
160 FUEL=25: GRAVITY=.2: TINC=.3
170 WHILE CY < 180
180   TIME=TIME+TINC
190   PUT (CX-4,CY-4), CUR%,XOR 'erase current ship
200   CX=CX+VX: CY=CY+VY
210   VX=VX+AX: VY=VY+AY+GRAVITY*TINC
220   AX=0: AY=0: VX=VX+(-SGN(VX)*.05*TINC*ABS(VX))
230   PUT (CX-4,CY-4),CUR%,XOR 'place ship in new position
240   GOSUB 320
250 WEND
260 LOCATE 7,13: PRINT "Time "; TIME
270 LOCATE 9,13: IF CX>165 OR CX<155 THEN PRINT "Off target"
280 LOCATE 11,13
290 IF VY>2 THEN PRINT "Enormous ";
300 IF VY>1 THEN PRINT "Crash!!!"
310 LOCATE 1,1: END
320 '--------------- Get input key - apply thrust
330 A$=INKEY$: IF A$="" THEN RETURN
340 IF LEN(A$)<>2 THEN RETURN ELSE A = ASC(RIGHT$(A$,1))
350 FUEL=FUEL-1*TINC
360 IF FUEL<=0 THEN SOUND 150,3: RETURN 'out of fuel
370 IF FUEL<5 THEN SOUND 1100,1: SOUND 1400,2 'low fuel
380 IF A = 72 THEN AY=AY-1*TINC: GOTO 330 'cursor up key
390 IF A = 80 THEN AY=AY+1*TINC: GOTO 330 'cursor down key
400 IF A = 75 THEN AX=AX-1*TINC: GOTO 330 'cursor left key
410 IF A = 77 THEN AX=AX+1*TINC: GOTO 330 'cursor right key
420 GOTO 330
430 '--------------- Initialize
440 LINE (0,4)-(8,4): LINE (4,0)-(4,8): CIRCLE (4,4),4
450 GET (0,0)-(8,8), CUR%: CX=4: CY=4
460 LINE (0,180)-(319,185),,B
470 LINE (155,175)-(155,185)
480 LINE (165,175)-(165,185)
490 RETURN
```

Listing 1b. Lander Game for the Monochrome Display.

LANDERM

```
100 'LANDER by Richard Foard -- adapted for character display by Will Fastie
110 'requires BASICA, Either Adapter in 80 column mode.
120 'use cursor control keys to move ship
130 KEY OFF: WIDTH 80: CLS
140 SHIP$=CHR$(127)
150 GOSUB 450
160 FUEL=25: GRAVITY=.5: TINC=.3
170 WHILE CY < 24.5
180   TIME=TIME+TINC
190   LOCATE CY,CX: PRINT " "; 'erase current ship
200   CX=CX+VX: CY=CY+VY
210   IF CY>25 THEN CY=25 'adjust for touchdown to avoid error
220   VX=VX+AX: VY=VY+AY+GRAVITY*TINC
230   AX=0: AY=0: VX=VX+(-SGN(VX)*.05*TINC*ABS(VX))
240   LOCATE CY,CX: PRINT SHIP$; 'place ship in new position
250   FOR D=1 TO 200: NEXT 'delay
260   GOSUB 340
270 WEND
280 LOCATE 7,33: PRINT "Time "; TIME
290 LOCATE 9,33: IF CINT(CX)<39 OR CINT(CX)>41 THEN PRINT "Off target"
300 LOCATE 11,33
310 IF VY>2 THEN PRINT "Enormous ";
320 IF VY>1 THEN PRINT "Crash!!!"
330 LOCATE 1,1: END
340 '--------------- Get input key - apply thrust
350 A$=INKEY$: IF A$="" THEN RETURN
360 IF LEN(A$)<>2 THEN RETURN ELSE A = ASC(RIGHT$(A$,1))
370 FUEL=FUEL-1*TINC
380 IF FUEL<=0 THEN SOUND 150,3: RETURN 'out of fuel
390 IF FUEL<5 THEN SOUND 1100,1: SOUND 1400,2 'low fuel
400 IF A = 72 THEN AY=AY-1*TINC: GOTO 350 'cursor up key
410 IF A = 80 THEN AY=AY+1*TINC: GOTO 350 'cursor down key
420 IF A = 75 THEN AX=AX-1*TINC: GOTO 350 'cursor left key
430 IF A = 77 THEN AX=AX+1*TINC: GOTO 350 'cursor right key
440 GOTO 350
450 '--------------- Initialize
460 CX=1: CY=1: LOCATE CY,CX: PRINT SHIP$;
470 LOCATE 25, 1: PRINT STRING$(79,205);
480 LOCATE 25,38: PRINT CHR$(207);: LOCATE 25,42: PRINT CHR$(207);
490 RETURN
8888 RUN
```

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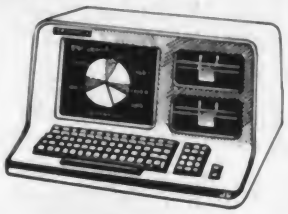

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Listing 2. Keypad Mode Control Demonstration Program.

KBFLAG

```
100 'KBFLAG - Demonstration of NUMLOCK funtion under program control
110 'Will Fastie -- 28 May 82
120 'Depress the escape key (ESC) to terminate program
130 'For these memory address definitions, see Tech. Ref. pg. A-2
140 DATASEGMENT = &H40
150 KBFLAG = &H17
160 NUMSTATE = &H20
170 'Main Program
180 KEY OFF: FOR I = 1 TO 10: KEY I,"": NEXT: CLS
190 DEF SEG = DATASEGMENT
200 GOSUB 460: GOSUB 360
210 'repeat
220   GOSUB 460
230   IF NEWSTATE <> OLDSTATE THEN GOSUB 360
240   OLDSTATE = NEWSTATE
250   'Decode keyboard, interpret + to mean NUMLOCK toggle. NumLock also works
260   C$=INKEY$: IF C$="" THEN GOTO 210
270   FUNCTIONKEY = 0: IF LEN(C$)=2 THEN FUNCTIONKEY = 1: C$=RIGHT$(C$,1)
280   C = ASC(C$)
290   LOCATE 10,1: PRINT SPC(39);
300   LOCATE 10,1: PRINT USING "Key code is ###";C;
310   'Some characters in the range 0 to 31 may cause strange display effects
320   IF FUNCTIONKEY THEN PRINT ", a function key"
                     ELSE PRINT ", the character ";C$
330   IF NOT FUNCTIONKEY AND C$="+" THEN GOSUB 410
340   IF NOT FUNCTIONKEY AND C$=CHR$(27) THEN END
350 GOTO 210
360 'Subroutine to display state of keypad
370 LOCATE 25,1: PRINT SPC(39);
380 LOCATE 25,1: PRINT "Keypad mode is ";
390 IF NEWSTATE THEN COLOR 8,7: PRINT "Numeric";: COLOR 7,0
                ELSE PRINT "Cursor";
400 RETURN
410 'Subroutine to toggle NUMSTATE
420 GOSUB 460
430 IF NEWSTATE THEN NEWSTATE = 0 ELSE NEWSTATE = NUMSTATE
440 POKE KBFLAG,(PEEK(KBFLAG) AND (NOT NUMSTATE)) OR NEWSTATE
450 RETURN
460 'Subroutine to get current state
470 NEWSTATE = (PEEK(KBFLAG) AND NUMSTATE)
480 RETURN
```

The first game I got was *Compucube* from Stoneware. The program is a Rubik's Cube manipulator that can either obey your commands as you try to solve the cube, or show you the solution. In addition, *Compucube* allows you to describe the particular cube configuration you wish solved, and then proceeds to solve it. The program requires a disk-based, 48K system with the Color Graphics Adapter, and costs $29.95.

I'm not a Rubik's Cube fanatic; I bought one of the books very quickly after I got the cube. I did enjoy playing with the program, however. It runs very well, and the graphic display is nicely done. You should be aware that the program does not rotate the cube faces. It simply redisplays the cube in the resultant configuration. If you liked the cube, you'll get your money's worth here.

Next I received a veritable blitz from Infocom, and if I ever get my hands on Marc Blank I'll strangle him! Why? Because I quickly became addicted to these games and spent too much time playing them and not enough time doing other things, like eating and sleeping and talking to my family—you know, little things like that.

The games are *Zork I* (The Great Underground Empire), *Zork II* (The Wizard of Frobozz), and *Deadline*. The Zorks are Infocom's adventure games. Now I am not a big fan of adventure games, for a variety of reasons, but I did enjoy playing these. One thing that helped me was that Marc sent along the Zork Users Group (can you believe it?) maps, which show you the entire layout. This saved me a lot of time, because I did not have to map the empire and could concentrate on playing and figuring out how to solve some of the problems.

It was fun, and I'll play some more for sure. However, I won't play them again until I solve the *Deadline* mystery. *Deadline* is a very, very good game, and it has some features that I have simply never seen before.

Deadline is a mystery "adventure" in which you are a detective charged with solving a murder case. I hesitate to use the label "adventure" because although the game works like the Zorks in the sense of player-computer interaction, it is totally different. For one thing, you play against the clock rather than for a score. For another, the game is a "real" situation, one you can identify with and understand.

Your intuition will work better here than in *Zork*. You are also not going to be eaten by a giant spider or something as you turn a corner. Another important factor is the dynamic quality of the game. People do things whether you see them or not. You might miss a clue if your timing is off. For example, once I was the last one to arrive for the reading of the will, but I was not late. When I was seen, someone said that everyone was present and we got started. But one time I was very late, and someone yelled angrily at me that I had kept them waiting. *Terrific*!

Deadline is tough, and enormously entertaining. I can't remember when I have enjoyed a computer game more. It does still have some rough edges, but Marc told me that most problems are gone and that the smoothing process is an on-going one. Good news, because the wrapper on *Deadline* says "First of the Interlogic Mystery Series from Infocom." I'm going to languish again waiting for #2.

The three Infocom games require a 48K system and work on any display. By the way, unlike most adventure games I have tried, these games speak English. For example, if you wanted to pick up the coins and the diamonds, you could say just exactly that. It's a lot more natural and intuitive.

Very close to my deadline (no pun intended) I got *Temple of Apshai* from Automated Simulations. This is fundamentally an adventure game, but it has a twist which will have me playing it for a while at least. The twist is animated graphics, which aren't bad, especially for a program written in Basic.

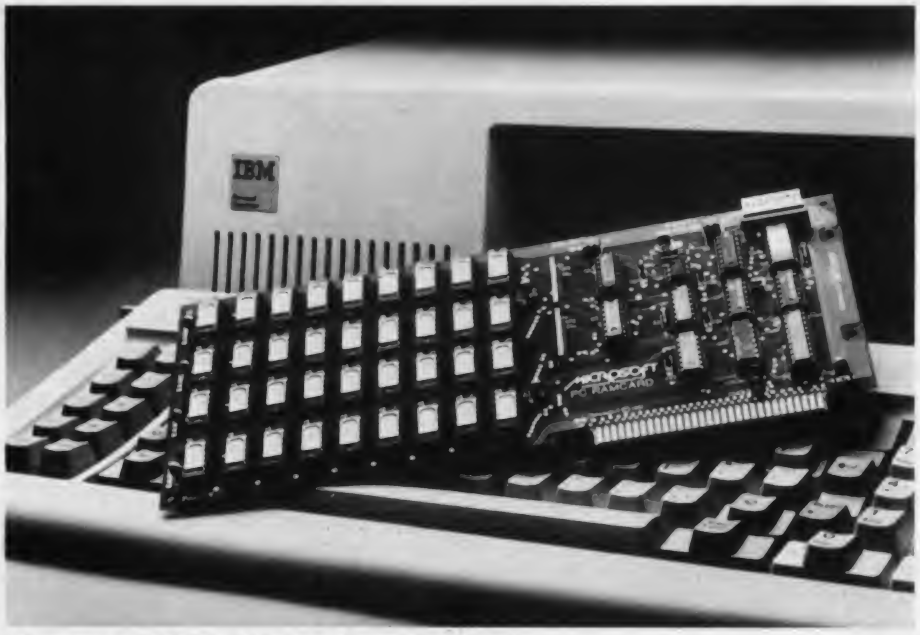
I played it just enough to get the idea, so I lack sufficient experience to comment fully. It was fun, but not enough to drag me away from *Deadline*. I'll say more after I've spent more time, but I enjoyed what I saw, even though I got killed pretty fast. You'll need a color graphics adapter for this game.

New Products

There are two more graphics screen dump programs available. RaTrax is from Ratcom, Inc., and costs $25. The Graphics Hardcopy System is from Versa Computing, Inc., and costs $24.95.

Rick Thomas, of Ratcom, kindly lent me a set of Graftrax-80 ROMS. I promise (I really do) to try all the packages for next time and let you know how they are.

Microsoft Corporation has announced their first hardware product for the IBM Personal Computer. It is the RAMCard, an add-in memory card supplied in 64, 128, 192, and 256K byte sizes. Prices range from $495 to $1095, in $200 increments. The board is expandable with 64K upgrade kits called RAMChip, costing $200. Also supplied is software called RAMDrive, which allows the memory to emulate a disk. The board is shown in Photo 1.



Microsoft's RAMcard Memory Expansion Card.

There are so many add-in memory manufacturers that it is becoming difficult to mention them all. At the end of the column I have listed all the companies I know of. Look for my comparative evaluation of memory cards in the upcoming *Creative Computing Buyer's Guide to Personal Computers, Peripherals and Electronic Games.*

Davong Systems, Inc. has announced a second hard disk for the PC. The DSI-514 provides 12 megabytes of storage capacity for the price of $2695. Software supplied includes a diagnostic program, the hard disk formatter, an installation/configuration program, and utilities. The software support is for IBM DOS, although Davong said support will be available for other operating environments as well.

Davong has also announced the DSI-ASYNC, an add-in board containing two asynchronous serial ports. The price of $199 includes software, including a set-up program and a full duplex terminal emulation program. The device is shown in Photo 2.

Ensign Software has announced four packages. They offer an *ISAM Database* package for $69.95, a *Bowling League Statistics Manager* at $99.95, and a *Basic Cross Reference* program for $24.95. The fourth package is *Games Package 1* for $29.95, a collection of ten games: Qubic, Othello, Kingdon, Cribbage, Black Box, Space Trek, Black Jack, Master Mind, Americans Quiz, and Presidents Quiz.

Lifeboat Associates has announced the *Lattice C Compiler* for the IBM Personal Computer. Compatibility is claimed with the Kernighan and Ritchie specification, with Unix V7, and with the BD C Compiler. The compiler supports the IBM DOS environment, can support the 8087 or invoke library functions, and produces relocatable machine code. The compiler costs $500.

An almost identical paragraph could be written for Computer Innovations' *C86 C Compiler*. At the time of this writing, certain features were still being implemented but the compiler is available, and updates are available at a nominal ($20) fee.

The big difference between this and the Lifeboat version is that the price of the compiler is $250, and George Eberhard says that he intends to hold this price, even when the compiler can generate in-line 8087 instructions. In addition, he claims the compiler and library will provide support for the IBM DOS, IBM CP/M-86, Compuview CP/M-86, and standard CP/M-86 (for the DisplayWriter, I guess) environments. The price for each is the same.

Applied Analytics, Incorporated, has announced microSpeed. They have provided microSpeed for the Apple II for several years and will soon be making it available for the IBM PC. For the Apple, Applied Analytics supplies an extended version of the Forth programming language and an add-in board using the Intel 8231A Arithmetic Processor.

The combination for IBM will be the software and the Intel 8087 Numeric Processor. Some current applications of microSpeed include real-time simulations of the displays on the Space Shuttle, and a Navy flight simulator.

I got a real surprise when I opened my mail to find an announcement from BYAD Inc. The product is the DS1 Expansion Circuit Board and Software Package. Guess what? The Xedex Baby Blue CPU + has some competition. This is an add-in board with a Z80B CPU and 64K bytes of memory. The DS1 costs $660, including software. The DS2 is a DS1 with the addition of a serial port, and lists for $760.

BYAD handles their Z80 differently than Xedex. CP/M 2.2 is supplied and "no special tasks...such as translation or adding headers" is required to run a CP/M program. This is a direct volley at Xedex, which does require translation of the CP/M program.

However, BYAD does not allow execution of the CP/M programs from the IBM DOS environment. Instead, their system disk must be booted, at which point the Z80 is engaged and CP/M takes control. The transparent operation of the Xedex product is a strong selling point. Like the Baby Blue, the DS1 acts as IBM memory when the Z80 is not active.

The presence of the serial port increases the value of the board. More important, however, is the fact that the system can be configured to allow the Z80 to control the serial port and act as an intelligent communications processor for the Personal Computer. In other words, you can have both processors running independently in such a configuration.

Media Systems Technology, Inc., has introduced a format module for their line of desktop diskette copiers. The module enables the copiers to automatically mass-

Davong System's Dual Asynchronous Serial Card.

produce IBM diskettes. This product is of greatest interest to software manufacturers who typically have a requirement for volume diskette production. The format module costs $450.

This next item might interest a few of you. I have been looking for someone who supplies continuous form, pressure sensitive labels on a 9 1/2" carrier. Most suppliers can provide labels on an 8 1/2" carrier, but my problem is my IBM 80 CPS printer modified with my Compu-Cable friction feed kit.

Once modified, the pin wheels (tractors) do not move, and are (you guessed it) 9 1/2" apart. Two sizes of label, both on the 9 1/2" carrier, are available from Misco. They are on page 58 of the Summer 1982 catalog.

A product called *The Answer* has been announced by North American Business Systems. The program is an information handling system. I call it that because the manufacturer objects strongly to the use of the term "data base" to describe his product. In fact, he is quite right because the *Answer* seems to be a totally unique and very flexible product.

I have seen the demo, but have yet to try the program out. I understand the underlying concept, however, and if half of what is claimed is true, this could be a very important software package. It costs $250.

Avalon Hill has announced their entry into the IBM market. Five of their games are now available for the IBM Personal: *Midway Campaign*, *Stocks & Bonds*, *Galaxy*, *Voyager*, and *Draw Poker*. I've played *Stocks & Bonds*, which is just like the board game, and it's enjoyable. The games range in price from $21 to $25.

Finally, I'm sure everyone has heard of Digital Equipment Corporation's (DEC) entry into the personal computer market. One of the three machines they announced, the Rainbow 100, uses both the Z80 and the 8088 CPU. The machine is touted as both an 8- and 16-bit CP/M system, running either CP/M-80 or CP/M-86.

This machine is obviously aimed at the IBM PC market, and has the advantage of competing in the general CP/M market as well. The significance to me is the 8088 CPU, the same one used in the IBM, and thus it can, and in fact does, run the same operating system used in the Personal Computer.

This is good news for IBM PC owners. First, the software market is richer as a result of the greater 8088 CPU population. Second, competition in this market is needed and can be effective, even against IBM. It'll keep 'em honest.

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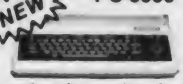

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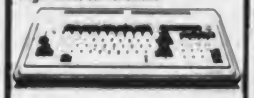

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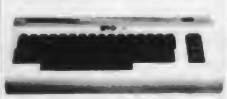

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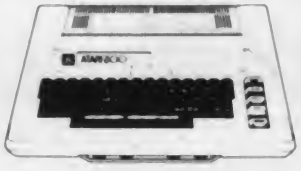

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Unfortunately, due to U.S. Postal limitations, the translated version of the game and manual have been lost in transit. S.D.S. therefore asks your assistance in determining the actual rules for the game, by translating the alien text of the instructions presented during game play.

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—Portrait System Software: This program includes captions and a credit line, reverse printing for T-shirt application and the option to save portraits on disk. Specifically for use with a Malibu 165 printer. Call or write for more information.

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CIRCLE 192 ON READER SERVICE CARD

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1 *Creative Computing* gives you things to actually do with a computer.

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4 *Creative Computing* covers computer education in depth.

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5 *Creative Computing* brings you hours of mind-expanding game entertainment.

We've got a soft spot for the computer game addict—and computer game software. We know you want to understand more about the new computer games flooding the market: which ones are easiest to learn? Require the most skill? Offer the most surprises? Give you the best graphics? Provide the most challenge? Contain a new twist? *Creative Computing* brings you the answers.

6 *Creative Computing* features the state of the art.

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CIRCLE 267 ON READER SERVICE CARD

Creative Computing IBM Personal Computer Survey

(for owners only, please)

How many IBM Personal Computers are represented by your answers to this survey?

1- _____

Note: If you are answering for more than one system, please answer the questions below for an average configuration, that is, one which is most representative of your systems. If your systems are very different, complete separate surveys.

Where did you buy the systems?

2-☐ IBM Product Center
3-☐ IBM Direct Sales
4-☐ Computerland
5-☐ Sears
6-☐ Other: _____

How old is your system?

7- _____ months

Please indicate the configuration of your system(s):

IBM Equipment

System Memory (main board) 8- _____ KB
9-☐ Monochrome Display Adapter
10-☐ Color/Graphics Adapter
Expansion Memory
11-☐ 32KB How many boards? 12- _____
13-☐ 64KB How many boards? 14- _____
Diskettes
15-☐ 160KB How many drives? 16- _____
17-☐ 320KB How many drives? 18- _____
19-☐ Asynchronous Communications Adapter
How many boards? 20- _____
21-☐ Printer Adapter
22-☐ 80 cps Printer
23-☐ Game Control Adapter

Non-IBM Equipment

Color Display Monitor
24-☐ RGB
25-☐ NTSC
26-☐ Black & White Monitor
27-☐ RF Modulator Modem
28-☐ Hayes Smartmodem
29-☐ Universal Data Sytstems (103LP)
30-☐ Other: _____
Diskette Drives
31-☐ Single-Sided How many? 32- _____
33-☐ Double-Sided How many? 34- _____
Hard Disk
Manufacturer 35- _____
Capacity 36- _____ megabytes
Line (Matrix) Printer
Manufacturer 37- _____
Model 38- _____
Letter Quality Printer
Manufacturer 39- _____
Model 40- _____

Where is (are) the IBM Personal Computer(s) you are reporting?

41-☐ Home
42-☐ School or College
43-☐ Small Business
44-☐ Medium Business
45-☐ Fortune 1000 Business

What will the system be used for (check all that apply, but circle primary one.)

46-☐ Entertainment
47-☐ Education
48-☐ Financial Analysis
49-☐ Accounting
50-☐ Word Processing
51-☐ Data Base/Filing
52-☐ Personal Accounting and Finance
53-☐ Laboratory
54-☐ Software Development
55-☐ Video Terminal
56-☐ Other: _____

What operating system do you use?

57-☐ IBM DOS (or MS – DOS or SB-86)
58-☐ IBM CP/M-86
59-☐ CompuView CP/M-86
60-☐ IBM UCSD P-system
61-☐ OASIS-16
62-☐ Other: _____

What IBM-supplied software is used on this system?

63-☐ VisiCalc
64-☐ EasyWriter
65-☐ Peachtree Accounts Receivable
66-☐ Peachtree Accounts Payable
67-☐ Peachtree General Ledger
68-☐ Inventory Control
69-☐ BPI General Accounting
70-☐ BPI Accounts Receivable
71-☐ BPI Inventory Control
72-☐ Time Manager
73-☐ Dow Jones Reporter
74-☐ Asynchronous Communications Support
75-☐ Pascal Compiler
76-☐ Fortran Compiler
77-☐ Cobol Compiler
78-☐ Macro Assembler
79-☐ Basic Compiler
80-☐ Adventure
81-☐ Fact Track
82-☐ Arithmetic Games set 1 or 2
83-☐ Typing Tutor
84-☐ Advanced Diagnostics

List non-IBM software you are currently using.

85- _____
86- _____
87- _____
88- _____
89- _____

Did you own a small computer prior to the IBM Personal?

90-☐ Yes Which one? 91- _____
92-☐ No

What factors influenced your decision to purchase the IBM Personal Computer? (check all that apply)

93-☐ Price
94-☐ Performance
95-☐ Functionality
96-☐ Hardware Design
97-☐ IBM Brand Name Recognition
98-☐ Software
99-☐ Reliability
100-☐ Expandability

IBM PC Survey, continued...

Overall, how would you rate the "goodness of fit" of the IBM Personal Computer to your requirements?

101-☐ Perfect Match
102-☐ Excellent
103-☐ Good
104-☐ Poor Match
105-☐ Complete Mismatch

Overall, how would you rate your satisfaction with the IBM hardware?

106-☐ Completely satisfied
107-☐ Very satisfied
108-☐ Satisfied
109-☐ Somewhat dissatisfied
110-☐ Completely dissatisfied

Overall, how would you rate your satisfaction with the IBM software?

111-☐ Completely satisfied
112-☐ Very satisfied
113-☐ Satisfied
114-☐ Somewhat dissatisfied
115-☐ Completely dissatisfied

Overall, how would you rate your satisfaction with the IBM documentation?

116-☐ Completely satisfied
117-☐ Very satisfied
118-☐ Satisfied
119-☐ Somewhat dissatisfied
120-☐ Completely dissatisfied

What service arrangements have you made?

121-☐ None
122-☐ IBM Product Center
123-☐ Computerland
124-☐ Sears
125-☐ Other Retailer
126-☐ Other Service Organization
127-☐ In-house

What do you think is the greatest strength of the IBM Personal Computer?

What do you think is the greatest weakness of the IBM Personal Computer?

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- VERSALEDGER II can handle more than one checkbook. **(IF YOU WANT IT TO)**
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CIRCLE 145 ON READER SERVICE CARD

rings...trs-80 strings...trs-8

Stephen B. Gray

At the forty-third serve from this side of the TRS-80 court, we listen to the Micromouth speech sythesizer, look at some special features of the Model III, check out the *Microproof* spelling checker, visit a Tandy Computer Center in London, and examine a short program involving prime numbers.

Micromouth

Connect ribbon cable on Micromouth to your TRS-80 Model I or III, run an audio cable from the output jack to a hi-fi amplifier or receiver, and then all you have to do is key in

OUT 127,17

and you'll hear a male voice saying "seventeen," very clearly.

If you use a small speaker, such as the two-incher in Radio Shack's "mini amplifier/speaker," the voice will sound a trifle gravelly. For best results, try a larger speaker, at least 5 or 6 inches in diameter.

Micromouth is available from Micromint Inc. (917 Midway, Woodmere, NY 11598) for the Model I ($150 kit, $175 assembled) and III ($200 assembled). You get a plastic box containing the circuit board, plus a connecting cable, separate power supply, and manual.

The Micromouth speech synthesizer is built around the Digitalker DT1050 integrated-circuit set from National Semiconductor, which has a stored vocabulary of 144 expressions. It can be connected to any computer that has an 8-bit parallel input/output port. Connected to the TRS-80, it requires only the simple Basic statement, OUT 127, plus a number from 0 to 143, to make it talk.

Digitalker synthesizes the human voice by waveform digitization, using pulse-code modulation (PCM) to create digitally-encoded speech, and storing the expressions in two 64K speech ROMs.

The vocabulary is limited, but synthesizers that store their vocabularies totally in ROM are generally less expensive than those which assemble phonemes to create any word of your choice. Also, they use a minimum of software.

The vocabulary of the standard Digitalker is best suited to monitoring instruments, to calculators, and to games, consisting as it does of the spoken numbers *one* through *twenty*, *thirty* through *hundred*, *thousand*, *million*, *zero*, letters *A* through *Z*, and words such as *ampere, comma, control, danger, error, flow, gallon, higher, kilo, minute, percent, please, pulses*, etc. Also included are 80-Hz and 400-Hz tones, plus sounds such as *ss* (to make plurals out of words on the list) and *re* as a prefix.

With this vocabulary you can easily create phrases such as "The time is 6:40 PM" or "Danger: a star is on the left at 1,000 meters." Simply put the digital addresses of the desired words in DATA lines, and use a timing loop to allow enough time for a word to be spoken before loading the next one. Without the pause between words, the whole phrase becomes a short, unintelligible bleep. For example, to program that first phrase, which gives the time, try

```
100 READ N
110 OUT 127,N
120 FOR X=1 TO 150
130 NEXT X
140 GOTO 100
150 DATA 138,139,96
160 DATA 6,22,47,44
```

Using a much shorter timing loop will shorten *forty* to *four*. However, although the longer loop provides enough time for *forty*, there's a little too much time between the shorter words. The preferred method of allowing time between words is to check the busy line before loading the next word. This way, speech can sound continuous no matter how long the individual words are. Simply replace lines 120 and 130 with

```
120 GOSUB 200
```

and add

```
200 IF INP(127)=254 THEN 200 ELSE
    RETURN
```

which will space the words just right.

The vocabulary can be extended by using a timing loop too short to allow all of a word to be spoken, and thus shorten *number* to *numb*, *meter* to *meet*, etc. Also, new words can be formed by combining shorter expressions, such as *extenuate* from *X, ten, U, eight*.

The first Micromouth expression called up by OUT 127,0 is "This is Digitalker," spoken by a female voice, which comes across clearer than the male voice used on the other expressions. Perhaps future ROMs will use that female voice; however, the only other speech ROMs available now are a pair (made by National Semiconductor) available from Netronics (333 Litchfield Road, New Milford, CT 06776) for $39.95 plus $1 for postage. The 135 word-vocabulary is also instrumentation-oriented, with words such as *adjust, caution, change, failure, fahrenheit, temperature, yellow, evaluate, pressure, window, water.*

Talking Hangman

A game using Micromouth is *Talking Hangman*; Micromint may have a few left, at $411 each. After you make your first mistake, a head appears in the noose

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CIRCLE 193 ON READER SERVICE CARD

and says, "Try again please." The talking head announces each letter you choose, and either says "Right on" if you get a correct one, or "Error--error-error" if not. If you lose, the word is spelled out vocally, letter by letter, as it is displayed on the screen. Hardly a major application of synthesized speech, but fun for the kids.

Model III Special Features

Several readers have asked for additional information on "the last six items on your list of special features" of the Model III (March 1982, p. 202). One reader thought that "apparently Radio Shack forgot to include this in their manual, and most owners don't know they can renumber lines, use hex constants, and so forth."

Well, I was wrong; actually, those six features are available only in Model III Disk Basic. They are among 25 "enhancements to Model III Basic" listed on page 93 of the Disk Basic manual, which says, "Disk Basic adds many features which are not disk-related." Once again, those six features are:

- Hex or octal constants can be used (in the form &H7FFF and &777) instead of their decimal counterparts in your programs.
- REM lines or spaces can be automatically deleted from your programs, using the compression routine CMD"C",R to delete REMs, and CMD"C",S to delete the spaces. Using CMD"C" alone will do both.
- Arrays can be sorted; one-dimensional string arrays only, that is, using CMD"O" to sort ("order") them, specifying the number of items to be sorted and the subscript of the first element to be sorted.
- Program lines can be cross-referenced using CMS"X", which searches lines for occurrences of a reserved word or other string literal, and lists the "finds" on the display as five-digit line numbers.
- A string can be searched to see if it contains another string, using INSTR (which can be done in Level-II Basic using MID$ and LEN$; see this column for May 1982, p. 204, for an example).
- Program lines can be automatically renumbered in RAM, using NAME 600,500,10, for example, to renumber all lines from 500 up; the first renumbered line will become 600, and the following lines will be incremented by 10.

INSTRING

Somebody in Fort Worth forgot to include in the Model III manual the INSTRING subroutine that's in the Level-II manual, perhaps because there's the single-command equivalent (INSTR) in Disk Basic. But that's no help to those who have a Model III without disk.

The string-handling subroutine, INSTRING, tests to see if a substring is contained in a larger string. It consists of three lines that use LEN$ and MID$.

First assign the larger or "target" string to X$, and the substring to Y$.

The first subroutine line

```
1000  FOR  I=1  TO  LEN(X$)-
      LEN(Y$)+1
```

searches string X$ from its first character to the last character that still allows the substring to fit within the larger string. That is, if the substring is three characters long, and the target string is eight long, the search ends at the sixth character, because beyond that, there is no room in the longer string for all of the three-character substring.

The second subroutine line

```
1010  IF  Y$=MID(X$,I,LEN$(Y$))
      RETURN
```

returns a value of I that gives the starting position of Y$ in target string X$, or a zero value for I if Y$ is not a substring of X$.

A third line is needed to end the subroutine:

```
1020 NEXT: I=0: RETURN
```

As the Level-II manual notes, a protective end-block is needed so that the subroutine is entered only by GOSUB:

```
999 END
```

The Level-II manual includes a sample program using the INSTRING subroutine:

```
 5 CLEAR 1000: CLS
10 INPUT 'ENTER LONGER
   STRING'; X$
20 INPUT 'ENTER SHORTER
   STRING'; Y$
30 GOSUB 1000
40 IF I=0 THEN 70
50 PRINT Y$; 'IS A SUBSTRING OF';
   X$
55 PRINT 'STARTING POSITION:';
   I,
60 PRINT 'ENDING POSITION:';
   I+LEN(Y$)-1
65 PRINT: PRINT: GOTO 10
70 PRINT Y$; 'IS NOT CONTAINED
   IN'; X$
80 GOTO 10
```

Electric Webster

Cornucopia Software (Box 5028, Walnut Creek, CA 94596) has a new version of *Microproof* (See "Hte Proofreader Porgrams," March 1982), called *Electric Webster*, which adds several features. It can display the dictionary for locating correct spellings. It has a "new precise symbolic dictionary that will not miss an error." It is "even faster than *Microproof* (formerly the fastest available)." And it has two additional options: simple grammatical checking, and automatic hyphenation. *Electric Webster* is $89.50 for the TRS-80 Model I or III, $149.50 for the Model II. The two options are $35 each; the correction option is still $60.

Cornucopia claims *Electric Webster*, using its 50,000-word dictionary, can proofread a several-page letter in 20 seconds.

TRS-80 in London

A recent visit to the Tandy Computer Center on Buckingham Palace Road in London brought out some interesting facts. For one, it's not called a Radio Shack Computer Center (nor a Centre, either). For another, it sells the Model I TRS-80.

Although the Model I could not be sold in the USA after the end of 1981 because of FCC rules on radio-frequency

"One person's trash is another person's spare parts."

radiation, there are apparently no such rules in England. So Tandy continues to manufacture the Model I for the British and similar markets. "We'll keep on selling the Model I for at least five years," a salesman said. "We have no plans to discontinue it; the keyboard is such a good seller. We'll keep up with the Model I disk drives and expansion interface and monitors and so on, for those who want to upgrade." The TRS-80 runs on 240-volt, 50-cycle current in the UK, by the way.

The best-selling software packages in this center are *Scripsit*, *Profile II*, *VisiCalc*, and accounting packages. The accounting software is not the American versions, "because we use different tax rates, account structures, and so many other details that are different," said the salesman, adding, "Our accounts packages are written in the UK." They carry names such as *Sales Ledger*, *Stock Control Purchase Ledger*, *Nominal Ledger*, and *Corplan*. That last one is a simulation for management decision-making.

The Last One sells for £300 (about $540) in Tandy Computer Centers; it's a menu-driven program generator, which asks many questions about what kind of program you want, and turns out a program written in Model II Basic. "The story is," a salesman told me, "the group that wrote it went looking for somebody to support them during the early days, and Tandy UK loaned them several Model II TRS-80s."

There are about 16 Tandy Computer Centers, some 200 "ordinary stores," and only about 30 franchised dealers in the UK, meaning England, Scotland, Northern Ireland and Wales.

The Color Computer is sold with a different TV set, because of the totally different PAL system, which uses 625 lines on the screen; the US NSCT system uses 525 lines.

The RSC-6 catalog available in the UK looks almost exactly like the US version, with a few differences; the prices are in pounds, the accounting programs are different, the Model I is included, and the Videotex systems are omitted.

Although several years ago the TRS-80s were just about double the US prices, prices are now coming down. In catalog RSC-6, UK hardware prices are 24 to 54 percent above US prices.

Prestel in the UK is similar to Compuserve in the US, but because it has a different format, Prestel can't be accessed by a TRS-80. Prestel is run by the post office, and has "about 10,000 pages of games, databases, etc."

Commenting on customers, a salesman said, "Half the time, the average man who walks in has too much information. He's spoken to somebody in a pub, who told him to get this or that. Or he may have been told by a friend that he really needs CP/M, and it takes quite a while to tell him it's not quite so. Re-education is the first step in many cases. Many come in, though, wanting *VisiCalc* or a word processor, and they ask for it straight-out."

Two London branches have classrooms with 16 Model III TRS-80s in each, for courses in Basic appreciation, *Scripsit*, *VisiCalc*, etc., which cost $50 to $300. *Scripsit* for the Model III is a three-day course, for $250.

Tandy has two repair services in London. They'll send a service engineer to your location, if you have a service contract. Otherwise you take your TRS-80 to the nearest Tandy store, and "a bloke comes around twice a week to pick them up."

Tandy UK has a high-resolution display for the Model I, from a Bristol-based company, providing 384 by 192 pixels. However, it's character-addressable, rather than by individual pixels. For £180 (about $325) you get 128 user-defined characters. High resolution for the Model III is also available from the same Bristol company, Microware Computing Services, but Tandy UK isn't marketing it, "because there seems to be a Model III version of hi-res supported by Fort Worth," which should be available later this year.

An *Applications Software Sourcebook* is one of the few UK-generated books at the Tandy Computer Centers. This one provides "Over 500 UK Program Listings," mostly for business-accounts programs, and all with UK addresses as program sources.

According to the London *Financial Times*, sales figures for June 1981 show that Tandy was leading the personal computer market with an installed base worth $385 million, Apple was second with $290 million, and PET third with $140 million. "But IBM could take second place by the middle of 1983." More recent figures show Apple ahead of Tandy.

Short Program #32: Prime Numbers

From Cavan, Ontario, Canada, R.W. Crawford sent this:

"Just a little while ago I was browsing through my past issues of *Creative Computing* and came across 'Short Program 11' in the July 1980 issue (p. 162).

"The program was submitted by Jim Raden and was described by him as not being '...useful at all, except maybe for some type of game.' Perhaps there was some hastiness on his part in saying this.

"I have modified the program to read as follows:

```
 10 DIM PN%(200): CLS
 20 FOR A%=1023 TO 2 STEP -1
 30  FOR B%=15359+A%*2 TO 16383
    STEP A%
 35   IF B%>16383 THEN 60
 40   POKE B%,170
 50  NEXT B%
 60 NEXT A%
 70 C%=1
 80 FOR A%=1 TO 1023
 90  IF PEEK(15359+A%)<>ASC(CHR$
    (170)) THEN PN%(C%)=A%: C%=C%+1
100 NEXT A%
110 CLS: D%=C%
120 FOR C%=1 TO D%:
     PRINT PN%(C%);: NEXT
130 GOTO 130
```

"I realized that his program started off by plotting the points that were multiples of 155 and continued to plot the multiples of each integer in ever-decreasing values from the initial value. It took only a short time to realize that if the screen wasn't cleared, the open points after the run of the program would be prime numbers.

"I haven't read the latest articles about finding prime numbers, but perhaps this item would lead to the development of another way to search for them up to a certain value."

For those without that 1980 issue of *Creative*, Jim Raden's original program was:

```
10 FOR A%=155 TO 1 STEP -1
20 FOR B%=15360 TO 16383 STEP A%
30  POKE B%,191
40 NEXT B%
50 CLS
60 NEXT A%
70 GOTO 10
```

□

"I POKEd where I should have PEEKed!"

Personal Electronic Transactions

I am happy to hear from you, and encourage your correspondence. I will try to acknowledge all correspondence, and a SASE makes things easier for both of us. Please send your letters to "Personal Electronic Transactions" c/o PO Box 354, Palo Alto, CA 94301.

Greg Yob

Two Little Programs For A Printer

Every time I get a new toy (peripheral, that is), there is a new set of commands to learn. My latest is the Epson MX-80 with the Graftrax ROMs. After thumbing through the manual for the tenth time, I gave up and wrote Program 1. This dumps a short summary of the Epson CHR$ codes which can be taped onto the cover of the printer. Now my CHR$ codes are only a glance away. (If you have a non-Graftrax Epson, most of the commands listed are still valid. Cross out the ones you don't use, or change the program.)

When I was writing the benchmark for Petspeed (see below) I had the minor problem of some sixteen items like:

Integer arrays processing 432 Jiffies

with each line separated by over a screenful of code. Naturally when the report was printed, I didn't get the Jiffies column correctly aligned each time. To find out how many spaces to add or delete, I wrote Program 3 which makes a sort of "ruler" for measuring the number of spaces between points. Run the program and fold the output where the exclamation points are printed to get a nice set of space markers for measuring your reports and forms.

If you prefer that the first column begin with 1, just change the FOR-NEXT limits to 1 TO 80 and 1 TO 132. Note the use of DEF FN to generate the right, middle and left digits in a number. The 48 is used to generate the ASCII code directly—that is, CHR$(48) = "0".

Benchmark Programs

I often see articles in other magazines which describe tests of the several varieties of Basic on several machines. This is called "benchmark testing" and the speed of execution is considered a valuable yardstick for measuring the performance of a system.

Program 1. Epson Printer Commands Summary.

```
10 REM EPSON PRINTER COMMANDS SUMMARY
20 PRINT"THIS PGM WILL DUMP SUMMARYS UNTIL YOU PRESS A KEY"
30 OPEN 4,4
40 PRINT#4:PRINT#4
50 PRINT#4,CHR$(15)
60 PRINT#4,"MODE              CHR$(TURN ON)     CHR$(TURN OFF)";
70 PRINT#4,"       MODE              CHR$(TURN ON)     CHR$(PARAMETERS)"
80 PRINT#4
90 PRINT#4,"CONDENSED CHARS     15                18         ";
100 PRINT#4,"       480 DOT GRAPHICS    27  75            <LOW>  <HIGH>"
110 PRINT#4,"DOUBLE WIDTH        14                20         ";
120 PRINT#4,"       960 DOT GRAPHICS    27  76            <LOW>  <HIGH>"
130 PRINT#4,"EMPHASIZED          27  69            27  70     ";
140 PRINT#4,"       LINEFEED HEIGHT     27  65            <0 OF DOTS>
150 PRINT#4,"DOUBLE STRIKE       27  71            27  72     ";
160 PRINT#4,"       LINES PER PAGE      27  67            <0 OF LINES>
170 PRINT#4,"ITALICS             27  04            27  05     ";
180 PRINT#4,"       RESET PRINTER       27  64            N/A
190 PRINT#4:PRINT#4
200 PRINT#4,CHR$(27)CHR$(64)
210 CLOSE 4
220 GETA$:IFA$=""THEN RUN
```

MODE	CHR$(TURN ON)	CHR$(TURN OFF)	MODE	CHR$(TURN ON)	CHR$(PARAMETERS)
CONDENSED CHARS	15	18	480 DOT GRAPHICS	27 75	<LOW> <HIGH>
DOUBLE WIDTH	14	20	960 DOT GRAPHICS	27 76	<LOW> <HIGH>
EMPHASIZED	27 69	27 70	LINEFEED HEIGHT	27 65	<0 OF DOTS>
DOUBLE STRIKE	27 71	27 72	LINES PER PAGE	27 67	<0 OF LINES>
ITALICS	27 04	27 05	RESET PRINTER	27 64	N/A

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CIRCLE 200 ON READER SERVICE CARD

As with any method of evaluation, benchmark tests can be carried to excess, obscuring other features of a system. For example, the time required to write and debug a program must be compared to the time used by the program during its service life—saving five seconds on a program that is used once or twice usually isn't worth the effort. The "ease of use" is very important for us humans, and as far as I know, there is no known "benchmark test" for it.

We can use benchmark tests in two ways. First, a benchmark can be applied to several systems to compare how they perform the same task. Second, a benchmark can be modified repeatedly and run on the same system. This provides an idea of the time required for different tasks on the same machine.

Here is a sample program for benchmarking:

```
10 T1=TI
20 FORJ=1TO30000:X=X+1:NEXT
30 T2=TI
40 PRINT(T2-T1)/60
```

I ran this on several different computers and came up with:

4032	131.77 seconds
8032	134.07 seconds
VIC 20	119.95 seconds

Rejoice, VIC owners, your machine runs the fastest of them all.

Program 3. Epson Spacing Counter.

```
100 PRINT"EPSON FORMS COUNTER"
110 OPEN 4,4
120 PRINT#4,CHR$(27)CHR$(64)
130 PRINT#4,"EPSON FORMS COUNTER"
140 PRINT#4
150 DEF FNA(X)=X-10*INT(X/10)+48
160 DEF FNB(X)=FNA(INT(X/10))
170 DEF FNC(X)=INT(X/100)+48
180 FORJ=0TO79:PRINT#4,CHR$(FNB(J));:NEXT
190 FORJ=0TO79:PRINT#4,CHR$(FNA(J));:NEXT
200 FORJ=1TO80:PRINT#4,"!";:NEXT
210 PRINT#4:PRINT#4:PRINT#4,CHR$(15)
220 FORJ=0TO131:PRINT#4,CHR$(FNC(J));:NEXT
230 FORJ=0TO131:PRINT#4,CHR$(FNB(J));:NEXT
240 FORJ=0TO131:PRINT#4,CHR$(FNA(J));:NEXT
250 FORJ=1TO132:PRINT#4,"!";:NEXT
260 PRINT#4,CHR$(18):PRINT#4:PRINT#4
```

```
EPSON FORMS COUNTER

@@@
```

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The Petspeed Compiler

Yummy! Hooray! A Basic compiler! I am sure you have a few long Basic programs that do useful things, but take a rather long time to do them. A data base program that sorts records and a scientific model which performs a few hundred thousand arithmetic operations are suitable candidates. If you use this kind of program every day, the delays become excuses to take coffee breaks and you waste a great deal of time waiting for the computer.

A compiler converts the program you have written into a form that will operate more rapidly in the PET. Basic does this in a minor way by using tokens for the keywords. Basic, however does not do anything about variables, GOTO or GOSUB. In Basic, each time a variable appears, the variables table must be scanned and the variable located. Similarly, the line referred to by GOTO or GOSUB must be converted into a 16-bit integer and then searched for.

There is a good reason for this inefficiency: most Basic programs are being changed or debugged and if the searches were eliminated the RUN command would have to scan the program for all variables, allocate space for them and also scan for the line numbers and make a jumps table or modify the line numbers after GOTO or GOSUB to become addresses (good for the PET but unreadable for humans). If this were done, you would have to wait a while before the program actually started operating.

When your program is finally debugged and you have no more changes to be made, it makes sense to scan for the variables, line numbers and so on and then generate a program with these values fixed inside the program. The time to do this is used only once, and in return you get a faster program, which cannot be changed once it is compiled. Software authors will certainly like this.

However, a Basic compiler should be able to read your Basic program just as it is, without any modifications, funny limitations or strange little commands. Most compilers have odd limitations—one I know of will not accept arrays of more than 126 elements. If the compiler needs some message to go, you must modify your program so it will compile, which is slow and difficult for the expert and impossible for the novice.

Petspeed, by Oxford Computer Systems (7 & 8 Park End St., Oxford, 0X1 1HH, England, £240; USA source: Small Systems Engineering, 222B View St., Mountain View, CA 94041, $325) is a Basic compiler which does it right. *Petspeed* will read any correctly running Basic program and produce a compiled version that you can LOAD and RUN from the disk. No funny commands are required, just the name of your Basic program.

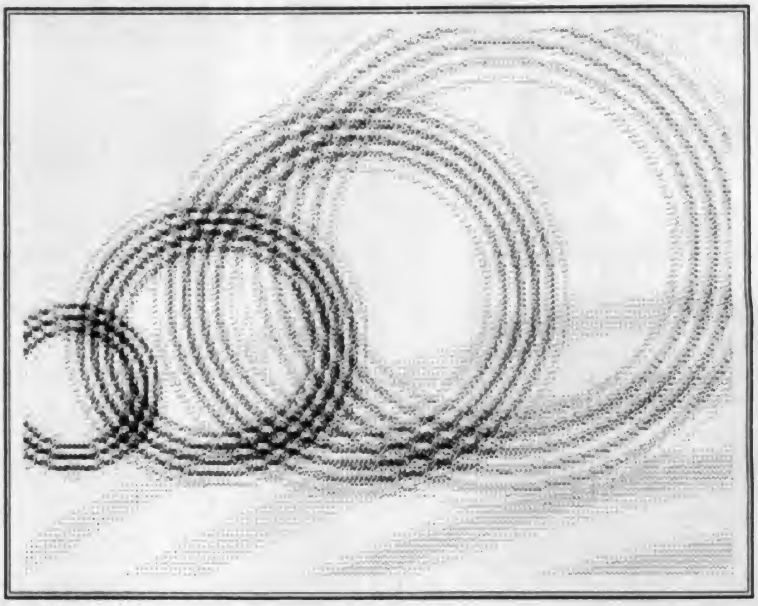

Figure 2. This example of printer graphics took 133 minutes in Basic and 48 minutes in Petspeed.

To use *Petspeed* you need the 8032 PET and preferably the 8050 disk drives. My copy of *Petspeed* came in a binder with clear and concise instructions.

Along with the disk there was a "dongle" which is an encased plastic thing-a-majig which plugs into the first Tape Port. (Be sure your dongle has both parts; I received only the lower half and had to get the remaining part before my *Petspeed* would work.) The dongle is used as a security device. You need the dongle to use *Petspeed*, though you can make as many copies as you like of the master diskette.

Operation is about as simple as you can make it. Put the master disk in Drive 0, your program disk in Drive 1 and press Shift/RUN. In a few moments, *Petspeed* appears on the screen and asks for the name of your program. *Petspeed* then goes through four passes, with line numbers appearing on the screen in a window. In about two minutes, the program is done and a SYS appears on the screen. Your program disk will now have the file PROGRAM.GT—the name of your program with the .GT appended. Home the cursor and press Return.

That's all. Your program is compiled and running. No fuss, no muss.

I timed the operation of the compiler; it took about one second per line of code to do a 200-line benchmark program. Since few programs exceed 500 lines in length most will be compiled in under five minutes.

Petspeed offers a few extensions to Basic as well, in particular the ability to use long variable names, the extension of DEF FN to handle strings and enable/disable of the STOP key. There are some tradeoffs as well: your program must be about 16K before the compiled version becomes smaller than the original; RUN nnn is not possible; dynamic array dimensioning (i.e. DIM X(N)) is not possible; PEEKs and POKEs which are used to modify the text area of a Basic program will not work in a predictable way (crashes are the usual result) nor will the CHARGET routine.

Petspeed will check the syntax and will complain if you inadvertently leave extension ROM commands in your program. I consider these limitations to be minor.

The most interesting thing is the speed of the compiled program, right? I wrote an extensive program to test the speed of many Basic features which was run both in Basic and *Petspeed*. The results are shown in Table 2. The various functions seem to fall into the following categories:

1. About the same as Basic—This is for input/output and the mathematical functions, both of which use the PET ROMs and so changes aren't expected.

2. About twice as fast as Basic. I think these benefit from immediate access to variables but are limited by the ROM routines that do the actual work. For example, X=1/Y will benefit from not having to search for X and Y, but will still require the ROM routine for division.

3. About four times as fast as Basic. These are probably done almost directly by *Petspeed* so the ROM routines don't get in the way.

Table 2. Comparison of Basic and Petspeed.

Benchmark Test For Timing Of Basic Execution Speeds

Test is for:	PET Basic in jiffies	*Petspeed* in jiffies	Ratio	Percent
FOR-NEXT loops (nested)	945	195	4.85	384.62
Integer arithmetic	1281	561	2.28	128.34
Floating point arithmetic	2418	1156	2.09	109.17
Transcendental functions	2370	2289	1.04	3.54
String manipulations	3625	811	4.47	346.98
Array operations with integer pointers	1444	128	11.28	1028.13
Array operations with floating point pointers	1618	376	4.30	330.32
Screen output with long text line	2228	1928	1.16	15.56
Screen output with short text line	1535	722	2.13	112.60
Writing to sequential disk file	1224	1284	.95	−4.67
Reading sequential file via INPUT number	1105	808	1.37	36.76
Reading sequential file via GET number	6105	2434	2.51	150.82
Using defined functions	1580	991	1.59	59.43
Subroutine calls	1156	16	72.25	7125.00
GOTO NNNN	1658	9	184.22	****.**
PEEK and POKE	1344	358	3.75	275.42

4. Ten or more times faster. These operations replace searches, as in GOTO, with direct addresses in the compiled code.

If I "average" these numbers I get a figure of merit of about 2.2 times faster than Basic. This is not the 40 times claimed in the advertisement, but is a worthwhile amount. Figure 1 shows a printer graphic that took 133 minutes in Basic and 48 minutes in *Petspeed*. This is a speed ratio of 2.77.

The speed improvement that you get depends on the emphasis of your program. I/O-bound programs, like data bases which talk to the disk a great deal, will probably run only twice as fast. Number crunchers which use arrays extensively might go as much as five or six times faster.

Petspeed is my first choice for a Basic compiler. If you spend time waiting for your PET to do things, consider compiling your programs. By the way, the compiled programs don't need the dongle to run.

A Quick And Dirty Program

Table 2 is actually a paste up of the values provided by three programs. Two of these are the Basic and *Petspeed* versions of a benchmark program (Sorry, there is no room to list the benchmark program), which printed the test items and jiffy values.

To compute the ratios and percentages I wrote Program 2 which let me enter the jiffy values and printed the results on my printer. Lines 80 and 90 require the use of *Disk-O-Pro* or *Command-O* which provide a PRINT USING which is used in line 150. (*Disk-O-Pro* and *Command-O* provide some interesting additions to Basic 3.0 and Basic 4.0, respectively, which are well worth the price (about $80 and $50, respectively) and can be purchased from Skyles Electric Works.)

The moral of this is that short and used only once programs can be very useful and sometimes even save some time, or at least make it pass with less drudgery.

PET/CBM Basic

Prentice-Hall has a new book—titled *PET/CBM Basic* by Richard Haskell ($12.95, 154 pp.) which is essentially a beginner's book for the PET. This is the kind of book that a teacher can use for an elementary programming class if the school uses PETs. Due to the delays involved in publication and distribution, *PET/CBM Basic* covers the old 8K PETs and the 2032 Basic 3.0 machines.

```
10 OPEN4,4:PRINT#4:PRINT#4
20 PRINT#4,"SPEED RATIOS, ETC"
30 INPUT"REMARK";R$
40 PRINT#4:PRINT#4,R$
50 PRINT#4
60 PRINT#4,"RATIO          PERCENT "
70 PRINT#4
80 SYS 984896
90 I$="####.##       ####.##"
100 FOR J=1 TO 16
110 INPUT"OLD,NEW";N1,N2
120 R=N1/N2
130 RV=R-1
140 RV=RV*100
150 PRINT USING#4,I$,R,RV
160 NEXT
```

Program 2. Quick And Dirty Ratios Program.

One of the problems facing a teacher of elementary computing is how to organize the material. The personal computer is the most complex product ever offered for an individual's use, and the mass of details can be overwhelming. *PET/CBM Basic* uses an alternating approach, a bit about Basic, then something that uses the screen graphically, then back to Basic and so on. This is a nice way to learn an idea: first with serious examples and then some play.

I do have some nits to pick on *PET/CBM Basic*. The photographs of the screen were often overexposed, losing important details. The exclusive use of photos of the screen for program listings I found tedious and hard to read. Except for small examples, I prefer to see hard-copy program listings.

The examples involving math were the usual dull "sides of a triangle," "interest rates" and so on, but the graphics examples were much better, so some care in the math examples would have been worthwhile. Appendix D on Hexadecimal Numbers is irrelevant. Hex numbers aren't used anywhere in the main text.

If you need a beginning book on the PET, *PET/CBM Basic* will get you started—and leave you with many questions for further exploration. I rate the book about 6 on a scale of 10, or about B-. □

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COMPUTERS

16-BIT PERSONAL COMPUTER

Olivetti Corporation has introduced the M20 Personal Computer. The M20 is based on a 16-bit microprocessor and uses a 16-bit bus.

Features include: functional keyboard, high resolution graphics display (512 x 256), memory expansion to 512K RAM, disk storage expansion from 320K mini-floppy disk to 11 MB hard disk (5 1/4"), variety of printers, interface expansion capability, multiple operating systems (PCOS, CP/M) to support a wide variety of application software, and self diagnostics.

The base price of the M20 is $2965 which includes the central unit with 128K memory, a 12" display, alphanumeric keyboard and a single floppy disk drive with a capacity of 320K bytes.

Olivetti Corporation, 155 White Plains Rd., Tarrytown, NY 10591. (800) 431-1366; in NY (914) 631-8100.

CIRCLE 305 ON READER SERVICE CARD

DESKTOP MICROCOMPUTER

R & B Computer Systems, Inc. has introduced the Model 10 all-in-one desktop computer which includes keyboard, video display, microprocessor, memory, disk drives, and graphics capabilities.

The single board computer contains a Z80A processor, 64K of RAM, an additional 20K of RAM to drive the bit-mapped display, a self-diagnostic boot PROM, an auxiliary 8035 microprocessor to control the keyboard and two 5 1/4" double-sided, double-density floppy disk drives.

The 12" green screen video display can be operated as a 1920 (24 lines x 80 characters) character display or as a bit-mapped display (240 x 640 pixels) where each pixel is controlled by one bit in the 20K display RAM.

R & B Computer Systems, Inc., 648 South River Dr., Tempe, AZ 85281. (602) 968-7101, (800) 528-7385, (800) 352-7490 (in Arizona only).

CIRCLE 306 ON READER SERVICE CARD

MAGAZINES, NEWSLETTERS

APPLE III USER'S NEWSLETTER

The Apple Three newsletter is a quarterly publication that serves those who share a common interest in the Apple III computer and its software.

This newsletter features news, information and reviews of ancillary equipment and applications software. It also includes a program exchange contributed by readers; a question and answer forum; bug reports and fixes, etc. A subscription costs $10 per year and includes the access fee to a planned computer bulletin board.

MediaWorks, P.O. Box 174, San Francisco, CA 94101.

COMPUTER GAMES MAGAZINE

Computer Games Review is a UK-based bi-monthly magazine devoted to reviewing new and established computer games software. All types of games are covered—arcade, adventure, strategy, educational, etc. Reviews involve in-depth assessments and evaluations of each game, and incorporate detailed ratings covering all aspects of the game, together with an overall rating.

Computer Games Review is available only by subscription from Computer Publications Ltd., 10 Star Lane, St. Mary Cray, Kent BR5 3LJ, England. Subscription rates (6 issues) are $26) or $38 (air mail).

VENDOR LITERATURE

SOFTWARE CATALOG

A new product catalog has been published by SouthWest EdPsych Services, Inc. The Apple II software catalog includes educational, medical, dental, veterinary, and business programs.

Also listed are hardware accessories for the Apple II including Slot Swappers and the Cassette Interface.

The catalog is available at no charge from SouthWest EdPsych Services, Inc., Box 1870, Phoenix, AZ 85001. (602) 253-6528.

CATALOG OF EDUCATIONAL SOFTWARE

Opportunities for Learning, Inc. announces the spring 1982 edition of Selected Microcomputer Software. The free 48-page catalog features software in the areas of mathematics, science, language arts, computer programming and literacy, logic and simulations, social studies, foreign language, business education, school business management, games, music, and art for the Apple II, TRS-80 Model I & III, PET/CBM, and Atari 400 and 800 microcomputers.

Opportunities for Learning, Dept. L10, 8950 Lurline Ave., Chatsworth, CA 91311.

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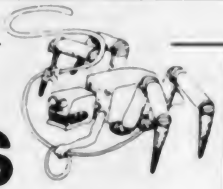

Katie and the Computer

Fred D'Ignazio and Stan Gilliam have created a delightful picture book adventure that explains how a computer works to a child. Katie "falls" into the imaginary land of Cybernia inside her Daddy's home computer. Her journey parallels the path of a simple command through the stages of processing in a computer, thus explaining the fundamentals of computer operation to 4 to 10 year olds. Supplemental explanatory information on computers, bytes, hardware and software is contained in the front and back end papers.

Thrill with your chidren as they join the Flower Bytes on a bobsled race to the CPU. Share Katie's excitement as she encounters the multi-legged and mean Bug who lassoes her plane and spins her into a terrifying loop. Laugh at the madcap race she takes with the Flower Painters by bus to the CRT.

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APPLE SOFTWARE CATALOG

Strictly Software has released its summer Apple catalog containing more than 500 varied offerings.

The free Catalog and software ordering information may be obtained by calling (800) 848-5253.

SOFTWARE CATALOG

Wall Street Software announces the 1982 edition of the Wall Street Software Catalog. The latest edition includes over 100 investment analysis software packages for personal computers.

Software packages listed cover option analysis, portfolio management, stock price trend forecasting, stock and option graphs, performance analysis, on-balance volume analysis of firms and market conditions, technical analysis, commodity analysis programs, charting and more. $3.

Wall Street Software, 71 Murray St., New York, NY 10007. (503) 342-8507.

TERMINALS & I/O

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Numonics has developed a lightweight, self-contained digitizer, called Digibit. Digibit fits into any system, converting graphic images into numerical values for the processor/computer.

It has a working area of 11" x 17" with 0.01" resolution and 0.02" accuracy. It digitizes in either point-to-point or stream mode on any surface, at any angle, including a CRT screen. $520.

Numonics Corporation, 418 Pierce St., Lansdale, PA 19446.

CIRCLE 307 ON READER SERVICE CARD

ELECTRONIC TYPEWRITER EXTENSION

Olympia USA introduces the Olympia EX100, an electronic typewriter extension with word processing system capabilities.

Consisting of an Olympia electronic typewriter, a 12" diagonal video display

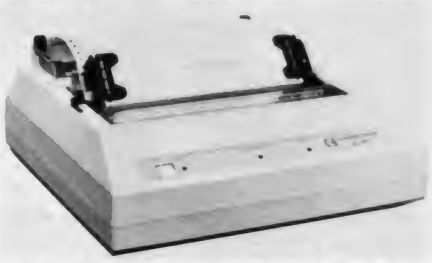
screen and a file storage device, the EX100 electronic typewriter extension performs all word processing functions, including automatic letter writing.

The Olympia EX100 electronic typewriter is priced under $3500 for the system, including the video display and file storage device, but without an electronic typewriter.

For further information contact: Olympia USA, Inc., Box 22, Somerville, NJ 08876. (201) 722-7000.

CIRCLE 308 ON READER SERVICE CARD

CROMEMCO PARALLEL PRINTER



Cromemco announces a parallel printer for use with Cromemco systems. The microprocessor-controlled impact parallel printer (Model 3715) prints 9 x 7 dot matrix characters at a rate of 150 characters per second.

The printer can print both upper-case and lower-case characters as well as character sets for both English and French. $1295.

Cromemco, Inc., 280 Bernardo Ave., Mountain View, CA 94043. (415) 964-7400.

CIRCLE 309 ON READER SERVICE CARD

PRINTER FOR COMMODORE MACHINES

Commodore Business Machines has introduced the CBM 8023P, a bi-directional, 136-column printer with both tractor and friction feed. The 8023P is dot-matrix, and prints 150 characters-per-second.

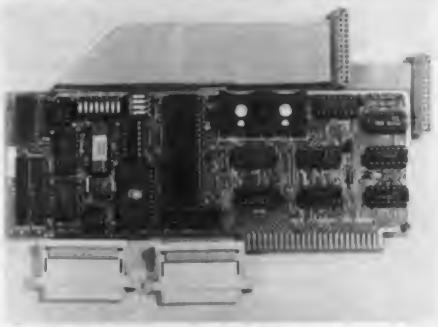
It is designed to operate through software control, prints upper and lower case alphabetic characters, and all graphic characters available with a Commodore computer, as well as user-defined characters.

The 8023P conforms to IEEE interface requirements and connects directly to a Commodore computer. It is designed to be used with the CBM floppy disk drives, and may be daisy-chained with other IEEE-488 devices. $995.

Commodore Business Machines, Inc., 681 Moore Rd., King of Prussia, PA 19406. (215) 337-7100.

CIRCLE 310 ON READER SERVICE CARD

TWO CARDS FOR APPLE II



Bit 3 Computer Corporation has introduced a two-port serial I/O card and a 16K RAM memory card for the Apple II.

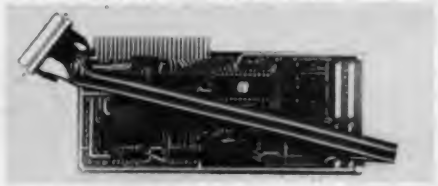
The Dual-Comm Plus adds two independent serial I/O interfaces to the Apple. It combines the features of the Apple High Speed Serial Card and the Apple Communications Card in one card with handshaking. Thumbwheel switches select the Apple slot locations. $239.

The Memory Plus 16K RAM expansion card adds another 16K memory to a 48K Apple. The product works with Pascal, DOS, CP/M, Fortran, Cobol, Pilot, Visicalc, Integer and Applesoft Basic. A three-position toggle switch is used to shut the card off or to select between the standard Apple Monitor ROM or the on-board firmware socket. $149.

Bit 3 Computer Corporation, 8120 Penn Ave. S., Minneapolis, MN 55431. (612) 881-6955.

CIRCLE 311 ON READER SERVICE CARD

PSIO BOARD FOR APPLE



The Intra PSIO, programmable serial I/O board, is compatible with current Apple Software including Pascal 1.1, Applesoft, and Integer Basic.

It provides a full EIA RS-232 DTE interface to most modems, printers and CRT terminals as well as an opto-isolated current loop interface strappable for full or half duplex, active or passive, two-wire or four-wire, 20mA or 60mA operation up to 200V.

On board 1K ROM software enables user programmable printer width control, delay after carriage return, automatic line-feed generation, and video display. $199.95.

Intra Computer, 101 W. 31st St., New York, NY 10001. (212) 947-5533.

CIRCLE 312 ON READER SERVICE CARD

MEMORY

S-100 MEMORY SYSTEM

Teleram Communications Corporation has introduced its S100B Bubble Memory System which is fully IEEE compatible.

The S100B MBMS is a self contained magnetic bubble memory system using the Intel 7110 1 megabit bubble device. Each board has a capacity of 128K to 256K bytes of non-volatile storage and takes up one slot in any S-100 system.

Driver software is included to interface the bubble system into any 8080/Z80 CP/M system (version 2.0).

Prices start at $2295 for 128K bytes and $3495 for 256K bytes.

Teleram Communications Corporation, 2 Corporate Park Dr., White Plains, NY 10604. (914) 694-9270.

CIRCLE 313 ON READER SERVICE CARD

DISK SYSTEMS

DISK DRIVE SYSTEMS

Columbia microSystems, Inc. announces the 1600 series 8" Disk Drive Subsystems.

The Subsystems use the Tandon Thinline DS/DD 8" drives. Storage capacity for two-drive units is 2.4 MBytes and 4.8 MBytes for the four-drive unit. The drives are one-half the thickness of standard drives, so two drives can be housed in a standard single-drive cabinet, while four drives fit into a standard two-drive cabinet.

Introductory prices are $1695 for the two-drive horizontal or vertical subsystems, $1750 for the two-drive low-profile unit and $2995 for the four-drive unit.

Columbia microSystems, Inc., 905 E. Broadway, Columbia, MO 65201. (314) 875-8900.

CIRCLE 314 ON READER SERVICE CARD

INTELLIGENT DISK SYSTEM FOR HEATH/ZENITH

Data Compass has announced an intelligent 8" floppy disk system for use with Heath/Zenith computers.

The company has also announced a standard, non-intelligent 8" drive subsystem for a variety of popular microcomputers,

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New Products, continued...

including the Apple II and TRS-80 Model II. Called the I-48, this 8" double-density, double-sided drive provides up to 1.6 megabytes of unformatted storage per drive.

The I-47 disk system consists of two intelligent 8" double-density, double-sided drives with a formatted capacity of 1.25 megabytes per drive. The drives, which are in a master/slave relationship, are built into a cabinet 13 1/2" wide.

A 6800 microprocessor on the master drive handles all the control and formatting functions, as well as giving direct access to signal status. $2795.

Peripherals Products Division, Data Compass, 2730 Regal Park Dr., Anaheim, CA 92806. (714) 630-7450

CIRCLE 315 ON READER SERVICE CARD

SYSTEMS SOFTWARE

LANGUAGES

Cavri Systems has released the *Ghostwriter* authoring system that allows non-programmers to create, modify and update interactive video of CAI programs. The *Ghostwriter* provides graphics capability, a comprehensive word processor/text editor, unlimited branching, and scoring of responses. Programs created can be used in training, education, point-of-purchase, and other information management applications. Cavri Systems, Inc., 26 Trumbull St., New Haven, CT 06511. (203) 562-4979.

CIRCLE 316 ON READER SERVICE CARD

Radio Shack now has the *TRS-80 MicroPILOT*, a command-oriented authoring language which allows teachers with no previous computer experience to create their own computer assisted instruction materials. Lessons, quizzes, student drills and exercises, as well as student record handling and graphics generation capabilities can be created. The program requires a TRS-80 Model I or III disk system with a minimum of 32K of memory. $79.95. Tandy Corporation/Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102. (817) 390-3300.

CIRCLE 317 ON READER SERVICE CARD

Color Forth, a high-level language for the Radio Shack Color Computer, is said to be a highly interactive language like Basic, with the structure of Pascal and execution speed close to that of Assembly language. It consists of the standard Forth Interest Group implementation of the language plus most of Forth-79, a super screen display, and a decompiler. Mass storage is via cassette interface. It auto-configures to 4K, 16K or 32K models and contains 10K of RAM. $109.95. Micro Works, P.O. Box 1110, Del Mar, CA 92014. (714) 942-2400.

CIRCLE 318 ON READER SERVICE CARD

MicroMotion announces *Forth-79 Version 2* for Apple II/II+, Z-80 CP/M 2.x, and NorthStar DOS users. Floating point and Hi-Res graphics are also available. The base system includes a screen editor, macro-assembler, string package, 32-bit integer arithmetic, and a 200+ page tutorial and reference manual. The retail base price is $99.95; with enhancements it is $139.95 (NorthStar Advantage users add $49.95 to include Hi-Res). MicroMotion, 12077 Wilshire Blvd. #50, Los Angeles, CA 90025. (213) 821-4340.

CIRCLE 319 ON READER SERVICE CARD

Organized as a dictionary of words, *OmniForth* is a high-level computer language based on fig-Forth and the 79 Standard which runs on the TRS-80 Model III. OmniForth contains an interactive compiler, Z80 assembler, file system and full screen video editor. It requires 32K memory and one disk drive. The package comes on disk complete with the 150 page OmniForth user's manual for $130 postpaid. Interactive Computer Systems, Inc., 6403 DiMarco Rd., Tampa, FL 33614. (813) 884-5270.

CIRCLE 320 ON READER SERVICE CARD

Nevada Pilot for CP/M-based systems is a string-oriented language designed for interactive applications such as data entry, programmed instruction and testing. It is a companion language for Basic, Cobol and Pascal and meets all of the Pilot-73 standards. Nevada Pilot requires 32K RAM, one disk drive and CRT or video display and keyboard. It can be used with Apple (softcard needed), TRS-80, NorthStar, Superbrain, Micropolis, Vector and other CP/M-based

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computer systems. $149.95. Ellis Computing, 600 41st Ave., San Francisco, CA 94121. (415) 751-1522.

CIRCLE 321 ON READER SERVICE CARD

Commodore Business Machines offers *Pascal Version IV.O* for its CBM microcomputers. All sections of code including main programs and sections of the operating system are treated as segments and move in and out of memory as needed. The IV.O runs on Commodore micros that use a 64K RAM card. It is compatible with other USCD users such as Texas Instruments, IBM, Phillips, and Zenith, and also has a multi-tasking capability and a debugger. It is available through Commodore's dealer network for $175. Commodore Business Machines, Inc., 681 Moore Rd., King of Prussia, PA 19406. (215) 337-7100.

CIRCLE 322 ON READER SERVICE CARD

SYSTEMS

Alcor Pascal is a Pascal compiler that runs on the TRS-80 Model I/III and Z80 equipped systems. It generates re-entrant ROMable code and can compile large programs with limited memory. Programs may be compiled into native code, or compiled into interpreted p-code, or a mixture of the two. The compiler package retails for $199, and the Advanced Development Package that contains the p-code optimizer and native code generator is $125. Alcor Systems, 13534 Preston Rd., Dallas, TX 75240. (214) 226-4476.

CIRCLE 323 ON READER SERVICE CARD

K-Dos for the Atari 800 is a machine language monitor which allows examination and alteration of memory in hexadecimal, and displays ATASCII representation. It also has commands that will reserve and erase memory and may be executed when the Basic or Assembler cartridge is in control. K-Dos also supports the Atari 850 handler which allows the use of printers and modems. E.A. Robinson, Inc., 2850 Rochester Rd., Troy, Michigan 48084. (313) 689-7000.

CIRCLE 324 ON READER SERVICE CARD

Edit is a full-screen Basic editor for TRS-80 Model I/III. The program has a full-floating cursor with autorepeat and over 30 commands for editing Basic text. It also has a Scripsit-like control structure. $40. Allen Gelder Software, Box 11721 Main Post Office, San Francisco, CA 94101.

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Accel3 is a basic compiler for the TRS-80 Model I/III. It handles unstructured FOR-NEXT loops and arrays, a 10% to 35% larger compact compiled code than Basic source, and multi-dimensioned arrays. $99.95. Algorix Software, Box 11721, San Francisco, CA 94101. (415) 387-3131.

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Basic' is a completely structured extension of the Basic language that is written via Editor'. Blocks of code are indicated without statements such as BEGIN and END, and debugging is automatic. It is available for the Apple, IBM Personal Computer, and the TRS-80. $129. Delta Micro Systems, P.O. Box 15952, New Orleans, LA 70175. (800) 535-1814.

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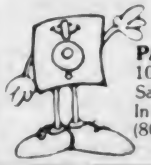

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New Products, continued...

base, modify records, format and print reports, or perform global editing functions. It requires an Apple II computer with 64K memory, the Apple Pascal operating system, two disk drives (5 1/4" floppy for the program disk and 5 1/4', 8" or hard disk for data), and a printer. $199.95. Powersoft, Inc., P.O. Box 157, Pitman, NJ 08071. (609) 589-5500.

CIRCLE 328 ON READER SERVICE CARD

File-Fax is a data base management system that offers quick access to files and records. Only a single disk drive is required, but it can accomodate up to eight disk drives. It will run on Apple II/II+ computers, with versions available for the NEC PC-8001, Atari, and Commodore computers. TMQ Software Inc., 390 N. East River Rd., Des Plaines, IL 60016. (312) 299-5671.

CIRCLE 329 ON READER SERVICE CARD

APPLICATIONS SOFTWARE

GAMES AND RECREATION

An expanded version of the *Original Adventure* game in which the adventurer explores the dangers, seeks the treasures and solves the puzzles of Colossal cave is available. A free Certificate of Wizardness is available to players achieving the maximum score. Original Adventure is available for $19.95 on 5" Heath/Zenith or Osborne 1 disk or 8" CP/M disk. Software Toolworks, 14478 Glorietta Dr., Sherman Oaks, CA 91423. (213) 986-4885.

CIRCLE 330 ON READER SERVICE CARD

A deadly German U-Boat, of a size and sophistication unsuspected by the Allies, and a between-wars international espionage race for survival are the themes of *Fathoms 40* and *Cloak & Dagger* for play on Apple II or Atari 800 and 400 computers. 48K with disk drive as well as joysticks are needed. Fathoms 40 is $39.95 and Cloak & Dagger retails for $29.95. Horizon Simulations, 7561 Crater Lake Highway, White City, OR 97503. (503) 826-4640.

CIRCLE 331 ON READER SERVICE CARD

Radio Shack offers a collection of eight game programs for the TRS-80 Pocket Computer that challenge deductive reasoning, marksmanship and gambling talents. The eight games are *Missile Marksman, Baccarat, Blackjack, Aceydeucey, One-Armed Bandit, Pokerslot, Numguess* and *Craps*. $14.95. Tandy Corporation/Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102. (817) 390-3300.

CIRCLE 332 ON READER SERVICE CARD

Muse Software has released *Firebug*, a game for the Apple computer written by Silas Warner. The scenario puts you, the Firebug, at the top of a five-story maze, complete with burning fuse, gasoline cans, and the dare to burn the floors down one at a time. Firebug for the Apple II/II+ computer with 48K and disk drive retails for $29.95. Muse Software, 347 N. Charles St., Baltimore, MD 21201. (301) 659-7212.

CIRCLE 333 ON READER SERVICE CARD

M.A.C. Software has released five classic adventure programs in which you try to outwit your adversaries to obtain your goals. *Jack and the Beanstalk Adventure* introduces the series, followed by *The Three Pigs and the Wolf Adventure, The Thief of Baghdad Adventure, Little Red Riding Hood Adventure*, and *Robin Hood Adventure* on disks one and two. Programs require a 48K Apple II+

or Apple II with Applesoft in ROM. Disks one and two are $24.95 each (the first adventure is free). M.A.C., P.O. Box 27, Chillicothe, OH 45601.

CIRCLE 334 ON READER SERVICE CARD

Hypergate Centurion and *Hypergate Patrol* are two science fiction games for the TRS-80. In Hypergate Centurion you are the guardian of the gateway to the galaxies and you have sworn to protect the friendly spaceships as they transit the hypergate. In Hypergate Patrol, you command a hypergate patrol ship and contend with most of the same situations that Hypergate Centurion does. Synergistic Solar Inc., P.O. Box 560595, Miami, FL 33156.

CIRCLE 335 ON READER SERVICE CARD

Cuban Fantasy is a simulation of Rubik's Cube for Apple computers. A six-color graphic display, random mixing to create a puzzle, consecutive moves (over 100 at once), and the ability to save the current cube for later recall are featured. It requires 48K, DOS 3.3 and Applesoft. $14.95. Yukon Computer Products, Inc., P.O. Box 37088, Minneapolis, MN 55431-0088.

CIRCLE 336 ON READER SERVICE CARD

Mazerace is a board game made by Computerware. It is a playing field filled with obstacles for one person against the computer or two people to play. It requires joysticks, extended Basic, and costs $17.95 on cassette or $22.95 on disk. Computerware also has *Storm*, an arcade game that has 135 levels of play, fast action, graphics, and sound. Also available is a *3D Drawing Board* for the Radio Shack Color Computer. It draws in three dimensions for education, entertainment, or serious projects. Both Storm and the 3D Drawing Board are $24.95 on cassette or $29.95 on disk. Computerware, Box 668, 1512 Encinitas Blvd., Encinitas, CA 92024. (714) 436-0282.

CIRCLE 337 ON READER SERVICE CARD

Color Berserk is a hi-res graphics game on cassette for 16K Radio Shack Color Computers. It features arcade game style with angry robots and Evil Orville challenging each other. *Cave Hunter* is a game for the 16K TRS-80 Color Computer in which you maneuver your way to the bottom of a spooky old cave to retrieve the treasures. Joysticks are required for both games, which are $24.95 each. Mark Data Products, 23802 Barquilla, Mission Viejo, CA 92691. (714) 768-1551.

CIRCLE 338 ON READER SERVICE CARD

"An educated man stands, as it were, in the midst of a boundless arsenal and magazine, filled with all the weapons and engines which man's skill has been able to devise from the earliest time."

Thomas Carlyle

Two Epyx games have been released for the Atari 400/800: *Crypt of the Undead*, in which the player only has 12 hours to set himself free from the cemetery; and *Escape From Vulcan's Isle*, in which the player is shipwrecked on a sea voyage and must get off the island somehow. It requires 32K with a joystick controller. $29.95. Epyx, P.O. Box 4247, Mountain View, CA 94040. (415) 964-8021.

CIRCLE 339 ON READER SERVICE CARD

Creative Software has released a variety of software packages. VIC Games that require the 5K VIC and cassette unit include *Seawolf*, *Bounceout*, and *VIC Trap*. All three for $24.95. *Household Finance Package* does basic accounting of your family's finances. $34.95. *Home Inventory* catalogs your possessions. $14.95. *The Logic Games Package* includes Code Maker and Code Breaker which are based on Mastermind. $14.95. *Math Hurdler* and *Monster Maze* are in the *Recreational/Educational Package II*. Both retail for $14.95. *Car Costs* helps you keep track of your automobile expenses in five categories. $14.95. To help analyze all types of loans, the *Loan Analyzer* does the calculations for $9.95. *Hangman* (try to guess the letters of a word) and Hangmath (try to guess the digits of a multiplication problem) are part of *Recreational/Educational Package I* for $14.95. Atari Software includes *Household Finance* (32K) for $34.95 and *Home Inventory* and *Car Costs* for $19.95 each. Creative Software, 201 San Antonio Circle, #207, Mountain View, CA 94040. (415) 948-9595.

CIRCLE 340 ON READER SERVICE CARD

computer store of the month

Computerland of Tampa, Florida

Numerous stores carry *Creative Computing* magazines and software. This month we would like to recognize Computerland of Tampa, FL.

A visit to the Tampa Bay area would not be complete without stopping by Computerland of Tampa, one of the area's most popular computer stores. Since the store was opened in September of '79 by Sam and Don Watson, former Digital Equipment employees, it has earned a reputation for dedication and service to the community. The store, managed by Arnie Stanger, maintains a policy of customer satisfaction through excellent product knowledge and customer support. A friendly staff and atmosphere encourage computer enthusiasts to stop in.

There is always something for everyone at Computerland. The store carries a broad range of products including *Creative Computing* magazine, books, supplies, software and peripherals. Computer lines include Apple, IBM, Osborne, Commodore and Atari. A full in-store service department stands behind every product sold. The store is staffed by Jim Holloway, Paul Sumberg, Brenda McBrayer, Halina Jaskiel, John Parker and Beverly Stanger.

Following the success of the Tampa store, two sister stores were opened in Clearwater and Seminole to serve the growing needs of the Bay area.

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CIRCLE 254 ON READER SERVICE CARD

iews...book re

Steve Gray, et al.

History of Programming Languages, edited by Richard L. Wexelblat. Academic Press, a subsidiary of Harcourt Brace Jovanovich, New York. 782 pages, hardcover $45. 1981.

This hefty book is the final proceedings of the 1978 ACM SIGPLAN History of Programming Languages Conference. It provides a fascinating and highly readable record of the early history of 13 major languages that, according to the book's jacket, "set the tone of most of today's programming."

The book describes the factors that influenced the development of these languages, covering their early development with emphasis on the technical aspects of the language design and creation.

Each paper and talk was prepared by one or two of the key technical people directly involved in the early development of the language: John Backus (Fortran), Alan Perlis (Algol), Jean Sammet (Cobol), Jules Schwartz (Jovial), Charles Baker (Joss), Thomas Kurtz (Basic), George Radin (PL/1), Adin Falkoff and Kenneth Iverson (APL), etc. Also included are Lisp, APT, GPSS, SIMULA and Snobol.

Included are the papers, transcripts of the presentations and the question-and-answer sessions, biographies of the speakers, and appendixes that provide summaries of each language, and photographs from the conference.

For anyone interested in how any of these languages got their start, this has got to be the definitive work on their origins. In the Basic session, for example, we learn why it was developed, what other languages influenced it, how it grew through six editions, and what Dr. Kurtz thinks of it now.

The book is fascinating, partly due to the great wealth of historical information, and to the many personal observations of those who were there at the beginnings. Kurtz says, at one point, "Our goal was to provide our user community with friendly access to the computer," and at another, "I think it's fair to say that more persons in the world know how to write simple programs in Basic than in any other language. It is true that most of them are probably still unable to vote or buy a drink. And if Fortran is the lingua franca, then certainly it must be true that Basic is the lingua playpen."

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67 Ready-To-Run Programs in Basic: graphics, home & business, education, games, by William Scott Watson. Tab Books Inc., Blue Ridge Summit, PA. 182 pages, paperback $6.95. 1981.

Publishing several dozen programs in Basic is a problem; the main question is what to include. Tab Books has put out several collections before, including a couple of good ones and one of all-too-simple subroutines. Ken Tracton wrote all three.

All the programs in Watson's book were written using Radio Shack's TRS-80 Level-I Basic. Although Radio Shack stopped marketing the Model-I Level-I TRS-80 last year, the language is current on the smaller Model III TRS-80.

Watson offers some introductory chapters (language, program size, tips) and four chapters of programs: games

(craps, Robot War, Labyrinth, and 26 more), graphics (electric crayon, sinewave manipulation, Supermaze, and 10 more), home and business (decision-maker, straight-line depreciation, breakeven analysis, and 13 more you'll never use either), and educational (math teacher, word quiz, permutations and combinations, and nine more). The index is curiously padded out by giving page numbers for each program, as well as for each listing, run, suggested variations, and list of variables, which makes the index five times as long as necessary.

The space, and a lot more of it, should have been used to explain how the programs work. However, most are so simple that most people with a year or two of Basic could write them all without working up much of a sweat.

So the main value of the book is for beginners and those too lazy to write simple programs. The author should have turned the book around by removing all programs and offering the rest as "Suggestions For Programs to Write."

The back cover says, "Here's your source of all the programs you've been wanting." If so, you're much too easily satisfied.

Software Psychology: Human Factors in Computer and Information Systems, by Ben Shneiderman. Winthrop Publishers Inc., Cambridge, MA. 335 pages, hardcover $24.95. 1980.

One of a couple of dozen books in the Winthrop Computer System Series, this is "designed for professional system designers, managers, and programmers, as well as for students," according to the back cover, which adds that "in the interest of improving programmer productivity, terminal user effectiveness, and system quality, Dr. Shneiderman describes current research techniques and supplies practical guidelines for programming and systems design."

The twelve chapters are on Motivation for a Psychological Approach, Research Methods, Programming as Human Performance, Programming Style, Software Quality Evaluation, Team Organization and Group Processes, Database Systems and Data Models, Database Query and Manipulation Languages, Natural Languages, Interactive Interface Issues, Designing Interactive Systems, and Computer Power To, Of, and By the People. The book ends with a 23-page bibliography, and Suggested Projects and Exercises.

The chapter on Programming Style offers stylistic guidelines on commenting, variable names, and indentation, and comments on programming language features such as conditional statements, iteration and recursion, flowcharting, etc. Each chapter ends with a Practitioner's Summary; this one says, in part, "Indentation is frequently advocated but its efficacy has not been demonstrated experimentally" and "Detailed standard flowcharts do not seem to improve programming performance." The rest of the book is equally forthright, and is written in as simple a style as possible for such a text.

However, the University of Maryland's document processing system, used to phototypeset the book, apparently has too long an exposure time, so some letters are too heavy, and thus most pages look as though set by hand in a Vietnamese village.

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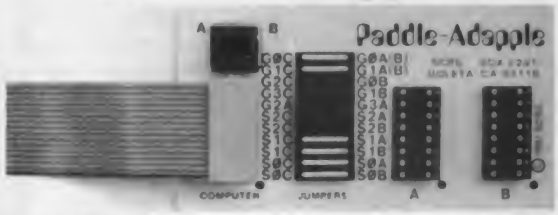

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Basic Programs for Home Financial Management, by W.B. Goldsmith Jr., Prentice-Hall Inc., Englewood Cliffs, NJ. 320 pages, hardcover $18.95, paperback $12.95. 1981.

Subtitled "A system of complete programs and asset management, and investment analysis," this big book (8 by 11, over an inch thick) provides 33 programs written on an unspecified computer in what looks like a version of Microsoft Basic. However, the dust-cover flap says the listings are "easily adaptable for use with TRS-80, Apple II, and other common home Basic computers." Some programs use LEFT$, LEN, MID$ or STR$; there are "no fancy graphics, sound effects, or other hardware-dependent features to confuse the issue," as the introduction puts it.

The programs fall into five categories: money management (checkbook reconciliation, bookkeeping worksheet, budget analysis, etc.), credit control (net worth statement, auto-loan analysis, real-estate loan status, etc.), major-asset management (life-cycle costing, lease/buy, home-insurance inventory, etc.), investment factors (retirement fund, net present value, stock plotter, etc.), and a file manager. Three appendixes offer a summary of Basic, three pages on hardware, and four pages on Mathematical Manipulations (interest approximation, number of payments, etc.).

For anybody who might just need to computerize his entire home finances, this book provides a lengthy description of each program that includes background information, detailed documentation and "operating notes." The writing is informal and simple enough for the near-beginner, who can run the programs without understanding how they work, after keying in 50 to 200 lines per program. The text is typewritten on five-inch lines to make them easier to read.

Video/Computers: How to Select, Mix, and Operate Personal Computers and Home Video Systems, by Charles J. Sippl & Fred Dahl. Prentice-Hall Inc., Englewood Cliffs, NJ. 254 pages, hardcover $15.95, paperback $7.95. 1981.

This is a guide to making your own integrated video terminal, or IVT, which combines a home computer and video hardware.

Six chapters cover the Integrated Video Terminal, The Video Enthusiast's Point of View (TV basics, VTRs, video disks, mixers, projection TV), The Computerist's Point of View (video games, home computers, monitors, color-graphics monitors, graphics), A/D/D/A (analog-to-digital and digital-to-analog converters, speech recognition, digital audio and video recording, analog systems), The Communicator's Point of View (data transmission, computer networks, video data transmission, facsimile, EFT, computer and video conferencing, fiber optics, satellites), and Conclusion.

The authors cover the material very well, writing clearly and with a minimum of technicalese, to provide a book that is probably unique and is well worth the reading for both amateurs and experts.

Beyond Games: Systems Software for Your 6502 Personal Computer by Ken Skier. Byte Books, Byte/McGraw-Hill Book Division, 70 Main Street, Peterborough, NH 03458. 433 pages. $14.95.

views...book

For the average personal computer owner who is used to programming in Basic, learning assembly language can seem an awesome task. That most assembly books are written with the experienced programmer in mind doesn't help. Well, owners of 6502-based systems can take heart because Ken Skier has written a book that will do much to ease the transition from Basic to 6502 assembler, and provide them with some useful software to boot.

Skier's goal is to teach 6502 assembly language not by just explaining all the instructions individually, but by showing you each one in its natural habitat: a program.

The program he uses is the Visible Monitor, a screen-oriented machine language monitor that is developed in steps. You start off by being introduced to the ideas of registers, hexadecimal notation, assemblers and the all-important concept of subroutines. Next, routines for handling screen I/O, displaying data in ASCII and hex, cursor positioning and clearing the screen are discussed and written. These routines are then brought together to form the nucleus of the Visible Monitor.

While the monitor is being developed, the reader is learning new programming concepts like stack and pointer usage, new 6502 instructions, and perhaps best of all, good structured design techniques. Once the basic monitor is complete, we continue on, adding more tools and enhancements: two different hexdump programs, a disassembler, a block memory move utility and a simple in-memory text editor. The last chapter in *Beyond Games* explains how the monitor can be loaded into your 6502-based computer.

Following the last chapter is almost 250 pages of appendices containing listings of the Visible Monitor and its extensions in three forms: fully commented assembly listings, hexdumps and Basic DATA statements for use with a Basic machine language loader program. There is also an appendix for each 6502-based system on which the monitor can run that explains the features (read "peculiarities") of each machine and how one can program around them. The Apple II, PET/CBM, Atari 400 and 800 and Ohio Scientific Challenger 1-P are covered.

There is much to like about this book. It is written in a nice, relaxed, almost conversational style without sounding cutesy or forced. It shows the process of designing and writing a non-trivial, useful piece of software in a clear and entertaining way. I am also impressed by the way in which differences between the various systems are kept isolated by use of a System Data Block, although there were some minor inaccuracies in both the PET/CBM and Atari appendices that could have been avoided without much effort.

One of the best ways of improving your programming skills is to be exposed to other, better programmers and the code that they write. *Beyond Games* lets the reader do just that; you get the feeling that you are looking over Ken Skier's shoulder as he writes the Visible Monitor, explaining every step as he goes.

I heartily recommend *Beyond Games* to the beginning 6502 programmer as a prelude to a more advanced 6502 book (like Leo Scanlon's *6502 Software Design*) and to the more advanced programmer as a source of good code to study and emulate.—*Steve Leth* □

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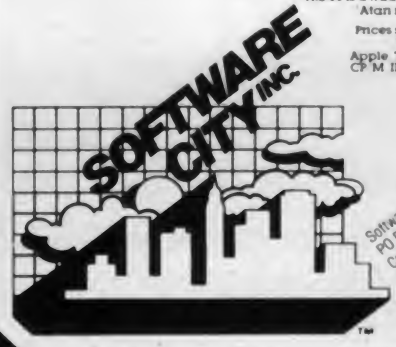

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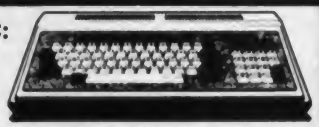

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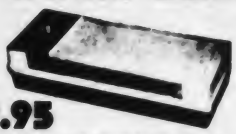

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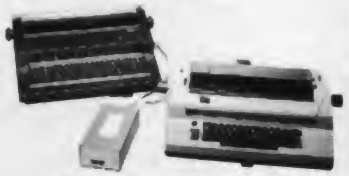

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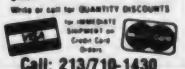

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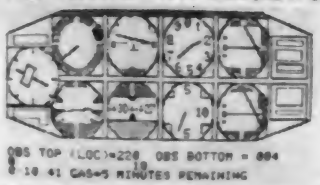
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